

# NETWORK WORLD

THE NEWSWEEKLY OF USER NETWORKING STRATEGIES

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## BUYER'S GUIDE

### T-1 muxes reflect user sophistication

BY JOHN J. HUNTER  
Contributing Editor

T-1 multiplexers and the people who buy them have become quite sophisticated. For example, drop-and-insert was hot stuff in the recent past, yet that capability is now considered archaic by many networking professionals. What's behind this growing trend?

Significant shifts are occurring in the ways users apply T-1 technology. According to Vertical Systems, Inc., a Dedham, Mass.-based consulting firm, point-to-point communications accounted for

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## BROADBAND NETS

### MAP/TOP drafts network cookbook

Guide covers installation, use.

BY MARY PETROSKY  
Senior Correspondent, West Coast

WARREN, Mich. — An arm of the MAP/TOP Task Force this month expects to release a detailed manual designed to help companies install and use networks based on the Manufacturing Automation Protocol and the Technical and Office Protocol.

The MAP/TOP broadband specification, two years in the making, is described as a cookbook for factory networks. It covers the design, implementation and maintenance of broadband MAP/TOP networks and includes a section on channel allocation.

"This specification is very important to the MAP community at this time," said Ali Bahrololoomi, chairman of the MAP/TOP Media Committee. While nearly 100% of

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## NETWORK SERVICES

### US Sprint to broaden digital data offerings

Firm will unveil family of dedicated services.

BY KARYL SCOTT  
Washington, D.C. Correspondent

NEW YORK — US Sprint Communications Co. is expected this week to introduce a family of new dedicated digital data services.

Sources close to the company said that, at a press conference here Tuesday, US Sprint will unveil digital data services ranging in speed from 2,400 bit/sec to 64K bit/sec, similar to existing digital data ser-

vices offered by other carriers. The carrier is also expected to announce an all-fiber, high-end T-1 service.

The lower speed services will support data, while the 64K bit/sec and T-1 facilities will support voice, data or video communications. The services are expected to be widely available throughout the U.S. and reportedly will be offered to users at flat rates.

Availability of end-to-end digital ser-  
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## ACQUISITIONS

### AT&T takes a shine to Sun

Investment could advance Unix as industry standard.

BY KARYL SCOTT  
Washington, D.C. Correspondent

MORRISTOWN, N.J. — AT&T said last week it will acquire up to a 20% stake in workstation manufacturer Sun Microsystems, Inc. The move could improve AT&T's lackluster performance in the computer business and advance its Unix operating system as an industry standard.

AT&T's plan to invest in Sun Microsystems comes just months after the two companies entered into a partnership to jointly develop a common version of the Unix operating system.

Analysts hailed the agreement. "AT&T gains valuable technical expertise from one of the pioneers in the technical workstation market, and Sun Microsystems gets a sizable financial infusion

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#### AT&T buys into Sun Microsystems



#### Sun Microsystems, Inc. profile

Headquarters: Mountain View, Calif.

Founded: February 1982

Employees: 3,800

1986 revenue/profit: \$210.1m/\$11.9m

1987 revenue/profit: \$348.6m/\$25.5m

(nine months)

Product family: Distributed computing systems, including workstations, Unix system software, data communications tools and networking software.

SOURCE: SUN MICROSYSTEMS, INC.

## NETWORK LINE

### News

► American Airlines, Inc. awards a multimillion-dollar contract for customized Centrex to Southwestern Bell, which will provide its Plexar service for the job. Page 2.

► The National Bureau of Standards plans to release final interoperability tests for Open Systems Interconnect applications and will broaden usage of its test network. Page 2.

► Moving to reduce dependence on telephone trading, the National Association of Securities Dealers will up-

grade its automated trading network. Page 2.

► A recent Federal Communications Commission order that forces AT&T to cut long-distance rates should benefit large users most. Page 4.

### Features

► It could have been a nightmare, but when relocation plans forced Delmarva Power & Light to reevaluate its network, the company replaced DDS circuits with multiple T-1 links. *Network World* tells how a telecommunications manager made sweet T-1 dreams reality. Page 30.

## SERVICE SETBACK

### US Sprint troubles keep user on hold

BY BOB WALLACE  
Senior Editor

PARK RIDGE, N.J. — An overload at a major switching node in US Sprint Communications Co.'s network, and concern about the carrier's financial and billing problems, forced Sony Corp. of America to delay the implementation of \$20 million of calling services.

Sony chose US Sprint to replace AT&T as its primary supplier of long-distance service in November 1986.

But, because Sony was uncertain of US Sprint's ability to meet its needs, the company did not finalize the contract until September 1987.

Richard Lack, technical services director for Sony, said  
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► **ADVANCED NETWORKS**

# American Airlines opts for customized Centrex

**BY PAM POWERS**  
Senior Editor

DALLAS — American Airlines, Inc. last week awarded Southwestern Bell Telephone Co. a multi-million-dollar contract for custom-designed Centrex services that will serve the airline's corporate headquarters here.

The contract is in response to a request for proposal issued by American last February for an all-voice network to support a new headquarters building that will house more than 2,500 telephone stations.

The service will replace a variety of private branch exchanges. Neither party would disclose the value of the contract.

**Plexar Centrex service**

Southwestern Bell will provide its Plexar Centrex service, formerly called ESSX, through a Northern Telecom, Inc. DMS 100 digital central office switch the phone company installed in leased facilities at the customer premises.

The DMS 100 will be connected to a remote switch module in the headquarters building by fiber cable.

Part of American's long-range

plan is to use the Southwestern Bell Centrex switch to support seven other buildings on the headquarters campus and two other buildings yet to be constructed. The buildings will have more than 15,000 telephone lines. The five-year contract also calls for future compatibility with Integrated Services Digital Network.

Southwestern Bell, through its unregulated subsidiary Southwestern Bell Telecom, bid its Centrex service against PBX proposals from IBM/Rolm Systems Division, AT&T and General Telephone Co. of the Southwest.

**Special tariff required**

Because of the complexity and custom nature of the project, Southwestern Bell filed a special tariff for the project, receiving interim permission for it from the state public utilities commission in October.

Since, as a regulated entity, the phone company could not provide inside wiring or telephone sets, Southwestern Bell worked the proposal through Southwestern Bell Telecom, which will act as American's sole point of contact for ordering new services and handling any service problems.

"It was to our advantage to be able to provide a turnkey proposal," said Steve Gravitt, senior account executive with Southwestern Bell.

Gravitt said Plexar will provide American with station message detail recording, automatic route selection and automatic call distribution services.

**Reliability is key**

For American, reliability was a key factor in its decision. The DMS 100 had the processor redundancy American requested, Gravitt said. And to ensure that the campus will never be cut off from the public network, Southwestern Bell built a separate microwave link to the public network that will serve as a backup to the primary cable link.

The DMS 100 will also connect to American's long-distance network, an AT&T common control switching arrangement network. Gravitt said that, eventually, the DMS 100 may become another node in that network. "American's choice was also a matter of economics," Gravitt said. "With our service, they don't have to scrap any of the private network investment they already have made."

The Centrex service will not be linked to American's Sabre reservation system network.

Commenting on the contract award, an American spokesman said, "Southwestern Bell offered the best features for the best price." The company declined further comment. □

► **INTEROPERABILITY**

# NBS set to finalize OSI tests

*May open testing net for wider use.*

**BY MARY PETROSKY**  
Senior Correspondent, West Coast

GAITHERSBURG, Md. — The National Bureau of Standards (NBS) early next month expects to release final interoperability tests for Open Systems Interconnect (OSI) applications and to open up its test network for broader usage.

In addition, NBS' Systems and Network Architecture Division expects to begin testing in March a gateway that links systems running International Standards Organization (ISO) protocols with systems running the Department of Defense's Transmission Control Protocol/Internet Protocol.

The Systems and Network Architecture Division manages the OSI test network, known as OSInet. It has also spearheaded development of interoperability tests for applications based on the X.400 electronic mail and File Transfer and Access Method (FTAM) international standards. The tests determine whether different implementations of OSI applications can work together.

The interoperability tests were developed in conjunction with OSInet's 25 members, according to Jerry Mulvenna, manager of NBS' network applications group. OSInet members include vendors such as AT&T, IBM and Unisys Corp., as well as government agencies such as the Department of Agriculture and the Department of the Navy. Currently, members are adding final comments to the tests.

OSInet supports computer equipment at member sites via an X.25 packet network. The X.400 and FTAM tests are designed to test various vendors' software implementations against each other. For X.400, for example, there is a suite of 69 tests, some of which are optional, Mulvenna said. One such test checks to see if a vendor has properly implemented a notification that indicates if a message is not delivered.

During a meeting slated for Feb. 3, OSInet's steering committee is expected to modify the OSInet charter to allow nonmembers to

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► **FINANCIAL INDUSTRY**

# Crash leads NASD to alter trading net

**BY JOSH GONZE**  
Senior Writer

TRUMBULL, Conn. — Stung by the Oct. 19 stock market crash, the National Association of Securities Dealers, Inc. (NASD) last week announced plans to revamp its automated trading network, diminishing reliance on traditional trading by telephone.

NASD said it expects to install by June 30 new software on the large processors that support its automated trading network and on

traders' workstations linked to the network. The software will automate trading of large blocks of stock on the over-the-counter (OTC) stock market.

Currently, the automated trading network is limited to handling blocks of up to 500 or 1,000 shares, depending on the type of stock. OTC stock traders, known as market makers, must consummate larger trades over the telephone and then follow a lengthy paperwork procedure.

For several days following the

Oct. 19 crash, trading in the OTC market was slowed when market makers had difficulty contacting potential investors by telephone and carrying out the required trading procedures. As a result, many customers' orders could not be executed. In part, the new software is intended to avoid a recurrence of those problems.

Under the new system, market makers will have the option to forward buy-and-sell orders to NASD via the network. NASD computers

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**DATA DELIVERY/NET MANAGEMENT**

Healthcare firm Maxicare cuts costs in its coast-to-coast network by using T-1 circuits and voice-compression technology. **Page 19.**

**COMMUNICATIONS MANAGER**

After 20 years in the DP field, CertainTeed's Robert Parechan leaves MIS to become telecommunications manager for the building products giant. **Page 21.**

**NEW PRODUCTS AND SERVICES**

AT&T's new Accunet T1.5 channel service unit allows users to access ESF-type diagnostics. **Page 23.**

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*Network World* wants to make its news coverage even better, and for that we ask your help. If you know of an interesting event that just occurred or is about to occur, please call. We'd also like to know how you optimize your networks. Call Editor Bruce Hoard toll free at (800) 343-6474.



# TIMEPLEX/UNISYS:

## RESHAPING THE FUTURE OF COMMUNICATIONS NETWORKING

On November 9, Timeplex and Unisys announced an agreement whereby Unisys plans to acquire Timeplex. As a result, some things will change. Many things **WILL NOT CHANGE**.

- Systems Connectivity Architecture, our corporate philosophy, **WILL NOT CHANGE**. SCA describes our commitment to provide open systems connectivity and support to meet the current and changing needs of our customers' networks.
- Designing integrated systems solutions for integrated network management and control **WILL NOT CHANGE**. Multi-vendor systems are a reality and connectivity is key.
- Supporting current and evolving standards through: open interfaces to TIME/VIEW, our integrated network management system; on-going support of IBM's NetView; participation in standards bodies, and the pursuit of standards such as OSI with other vendors **WILL NOT CHANGE**.
- Developing innovative technology that expands our customers' existing systems by providing a smooth migration path while protecting their present investment **WILL NOT CHANGE**.
- Our Timeplex name, our organization and the Timeplex team that has served our customers for over 18 years **WILL NOT CHANGE**.

**WHAT WILL CHANGE**, is that we now will enjoy the backing of Unisys, a \$10 billion information systems company. This will help us to enhance our market leadership position, and our ability to deliver business communications solutions.

The foundation of our success has been our relationship with our customers. More than ever, Timeplex will remain their communications partner—solving their voice/data networking problems—today and in the future.

**Timeplex...** The Connectivity People.



Timeplex, Inc.  
400 Chestnut Ridge Road  
Woodcliff Lake, NJ 07675  
(201) 930-4600

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# ► NETWORK EQUIPMENT TECHNOLOGIES

## NET announces new stat mux

BY PAUL KORZENIOWSKI  
Senior Editor

REDWOOD CITY, Calif. — Network Equipment Technologies, Inc. (NET) plans to buttress its statistical multiplexer line with a new mid-sized model to be announced this week, *Network World* has learned.

The company's SPX multiplexer will support eight to 40 asynchronous or synchronous ports at speeds up to 19.2K bit/sec. On the link side, the device supports synchronous transmission at speeds up to 64K bit/sec.

The multiplexer can be used in point-to-point applications or in a group of up to 40 lines and 1,500

ports.

Like NET's high-end Integrated Digital Network Exchange (IDNX) T-1 multiplexers, the SPX features dynamic routing and intelligent switching, meaning the multiplexer will automatically seek out alternate paths in the event of a line failure.

Software running on an IBM Personal Computer can be used to manage the statistical multiplexer, or it can be managed from an IDNX. NET is developing a more powerful network management system based on a Sun Microsystems, Inc. workstation, and the SPX will eventually be controlled by that system as well, according to analysts.

The new product was developed by NET's ComDesign Group, a unit formed by the acquisition of ComDesign, Inc. during the summer of 1986.

According to International Data Corp., a Framingham, Mass.-based market research firm, revenue for the mid-range statistical multiplexer market, at which the SPX is targeted, will increase by 2% in 1988. Timeplex, Inc. leads the market with 21.6% of revenue, and ComDesign is in the middle of the pack with 5.5% of the market.

The price for the SPX ranges between \$250 and \$350 per channel. The product will be available in March. □

# ► AT&T LONG-DISTANCE CHARGES

## FCC order to cut rates seen as boon to users

*Analysts say large users will gain most.*

BY KARYL SCOTT  
Washington, D.C. Correspondent

WASHINGTON, D.C. — Network users reacted favorably last week to a recent Federal Communications Commission order that will result in a \$772 million, or 3.5%, cut in AT&T long-distance telephone rates.

The cuts, which went into effect Jan. 1, are expected to benefit both business and residential customers, although large corporate users will benefit the most, according to industry analysts.

The price reductions are the result of FCC-ordered cuts in local exchange carrier access charges. These fees make up roughly 50% of the cost of long-distance service and represent the cost of connecting end-user telephone lines to long-distance networks — a service provided by local exchange carriers.

The FCC on Dec. 24 rejected many of the 1988 Access Tariffs filed by the regional Bell holding companies and ordered major reductions in special and switched access rates. Special access is used in private lines, and switched access is used in all other types of switched services.

On Dec. 31, the FCC ordered AT&T to pass those access charge cuts on to its long-distance customers.

"Projected [local exchange carrier] telephone costs were found to be excessive," the FCC's order said. In many cases, cost and demand information supplied by the local exchange carriers failed to justify the proposed changes in access rates, the FCC noted.

In addition, the order said, "The FCC has concluded that the local

companies seriously underestimated long-distance traffic, which is currently growing by 14% annually. The local carriers projected that 1988 traffic would grow by only 3.6%."

Users welcomed the decision not only because they will enjoy lower long-distance rates in 1988 but because the FCC went further than ever before in scrutinizing carrier tariffs.

"The FCC sent a signal to the industry that it plans to look more closely at these tariffs and not accept the carriers' proposals at face value," said Brian Moir, attorney for the International Communications Association.

"For too long, the FCC gave the Bell companies the benefit of the doubt and let them file whatever they wanted," Moir said.

Industry analyst Page Montgomery of Economics & Technology, Inc., a consulting group in Boston, said, "The FCC is being much more critical of both Bell operating company and AT&T tariffs these days. Users groups and members of Congress have let the FCC know that they want strict enforcement of the rules. Rep. Edward Markey (D-Mass.) has indicated that he won't support any new rule changes, such as price caps, unless the FCC proves it can enforce the existing rules."

The \$772 rate cut is slightly less than the \$800 million reduction proposed by AT&T in November, when it urged the commission to require the RBHCs to lower access charges.

The FCC-ordered cuts are substantially greater than the \$151 million reduction proposed by the local carriers in October, which was less than a 1% reduction.

In addition, the FCC ordered the local carriers to cut special access tariff rates by \$39 million, compared with the \$262 million increase proposed by the local companies in October.

The FCC suspended certain special access tariffs of Bell Atlantic Corp., Nynex Corp. and Ameritech, pending an investigation.

Further reductions in special access rates could be ordered by the FCC after the investigation is completed, according to the FCC statement.

The FCC said the RBHCs did not provide adequate cost-justification for the massive increases in private-line access.

The commission also slapped AT&T on the wrist by launching an investigation into the manner in which AT&T plans to pass on the access cost savings to customers.

"AT&T is using strategic pricing with these rate cuts," said tariff analyst Robert Ellis, president of The Aries Group, Inc., a consulting firm in Rockville, Md.

"AT&T has proposed larger increases in daytime rates than in other time periods. It is also maintaining the same price differences between various services so that customers won't be enticed to change from one service to another."

"If AT&T actually flowed the cuts through the exact way they were proposed, Pro America, Software-Defined Network and Direct Distance Dialing service customers would have benefited the most," Ellis said.

The largest price cuts will occur during daytime hours, according to AT&T, with smaller decreases occurring during evening and late night periods. Daytime rates will fall an average of 6.4%; evening rates will be cut 1.9%; and late night rates will fall 0.6%.

Business rates will go down about 3.6% overall. AT&T's long-distance rates have declined a total of 36%, or \$8 billion, since 1984, largely due to cuts in access costs.

The following is a list of rate

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► **DOCUMENT DELIVERY**

# SNADS to take lead in peer-to-peer SNA nets

**BY PAUL KORZENIOWSKI**  
Senior Editor

IBM's Systems Network Architecture Distribution Services (SNADS) is expected to play an increasingly important role in peer-to-peer SNA networks as IBM enhances the product and customers come to understand it better.

SNADS is a method for moving documents among devices on a network. The delivery mechanism was designed for distributed processing environments and can be used to move files from one system to another through a series of intermediate processors.

IBM has incorporated SNADS support in a few applications, and third parties have begun to offer their own SNADS software that allows users to add document distribution capabilities to applications.

SNADS offers a number of advantages over traditional SNA delivery options. Historically, SNA devices could send information only after an end-to-end connection had been established. This worked well with terminal-to-mainframe networks because the terminal could not function unless it was connected to a host. But as intelligent processors were added to networks, customers needed other methods of exchanging information. Establishing a clear path through a variety of processors is difficult for two reasons.

First, all the processors in the connection need an open port at the same time. Also, the final processor has to be free to receive the document. For example, with SNA, users working on applications cannot receive messages until they store what they're working on. Under SNA, the document could not be delivered until the person finished working with the application.

SNADS eliminates the need for a clear end-to-end connection. The delivery mechanism simply moves documents from node to node whenever there is an open port. If there are no open ports, the document is stored on the sending device until a port becomes free on the receiving device.

To date, customers have used SNADS primarily for electronic mail applications. Michael Zisman, chief executive officer at Soft-Switch, Inc., a software firm in Wayne, Pa., predicted the use of SNADS will mushroom in coming years. "Users will discover that SNADS is suitable for file transfer and remote job entry applications," Zisman said.

The growing importance of SNADS can be seen in IBM's decision to include the delivery mechanism under Systems Application Architecture (SAA), an umbrella of IBM's most important software products and protocols.

Donald Czubeck, president of

Gen2 Ventures, a consulting firm in Saratoga, Calif., noted that IBM has begun using SNADS to distribute configuration and performance information.

In order for SNADS usage to grow, analysts said IBM must address product shortcomings. Currently, the delivery mechanism has mediocre network management capabilities. It offers few tools to monitor document distribution. Whenever a document does not

reach its destination, SNADS simply sends it out again.

This approach is adequate for transmitting small files such as E-mail but creates problems with larger files. Customers want to retransmit only the portion of the file that did not reach its destination. For example, they could resend the last 3M bytes in a 10M-byte file.

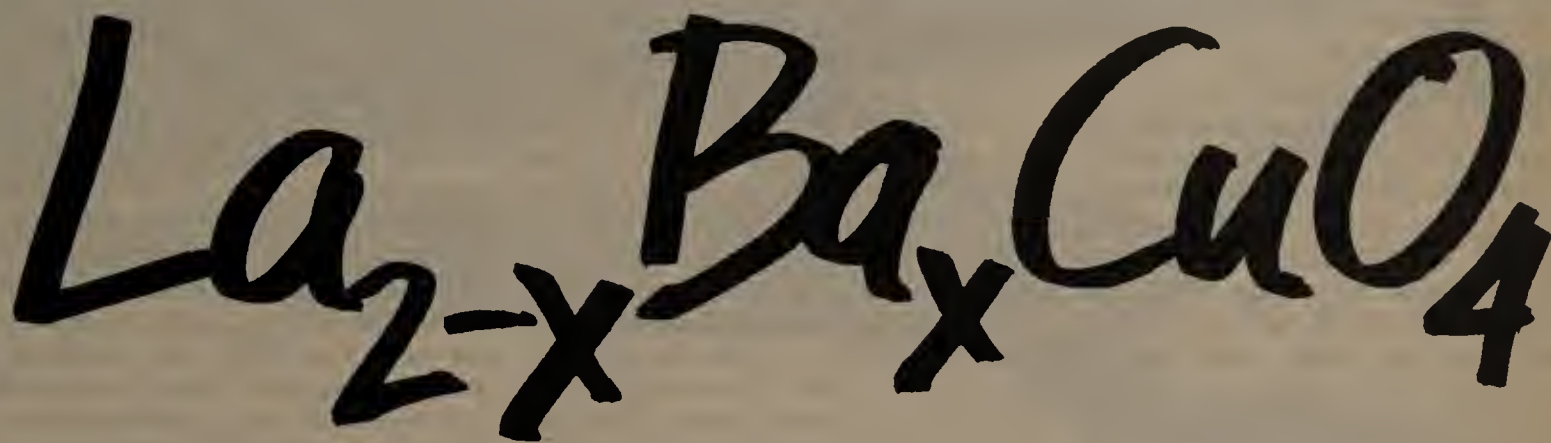
Analysts expect IBM to include this capability in the next release of SNADS, which may be announced by the end of the year.

"Network management has traditionally been concerned with whether or not a link was up. But what is more important is whether or not all the data is received," Czubeck said.

Another problem is that there are only a handful of applications supporting SNADS. The most widely used application is DISOSS, IBM's host E-mail and library services product.

Eduardo Stecher, president of Communication Associates, Inc., a consulting firm in Natick, Mass., predicted that a future release of MVS, an IBM host operating system, would include SNADS support. By placing the support in MVS, subsystems such as CICS and TSO would be able to utilize the delivery mechanism.

Recognizing that SNADS will grow in importance, software companies such as Communications Solutions, Inc. (CSI) in San Jose, See page 54



It started in an IBM lab in Zurich, Switzerland.  
Who knows where it will stop?

In January 1986, two IBM scientists, J. Georg Bednorz and K. Alex Müller, ended a long quest. They discovered a whole new class of superconducting materials, represented by the formula above.

Their breakthrough sparked enormous activity in an area of research most scientists had abandoned as hopeless.

Today, researchers at IBM, and throughout the world, are expanding on what these two started. And although no one can be sure where superconductor research will lead, there is potential for advances in everything from computers to medicine.

In October 1987, just 21 months after their breakthrough, Bednorz and Müller were chosen to receive the Nobel Prize in Physics.

Naturally, we're proud of these two scientists, just as we are of the two IBM scientists who won the 1986 Nobel Prize in Physics.

Providing a climate that fosters achievements like these has always been important at IBM. After all, advances of this magnitude do more than contribute to a company. They contribute to the world.

**IBM®**



## ► COMNET '88 PREVIEW

# Product parade slated

## Data compression, bypass gear on tap.

**BY JIM BROWN**  
New Products Editor

WASHINGTON, D.C. — Data compression devices, bypass transmission equipment and low-end X.25 packet switches are among the products expected to be announced at the Communication Networks '88 show opening Jan. 26 here.

The show, now in its 10th year, will play host to 375 vendors and an estimated 17,500 conference attendees, according to William Leitch, president of IDG Conference Management Group.

Symplex Communications Corp. of Ann Arbor, Mich., is planning to introduce its dual-trunk Datamizer II SDC-8e data compression unit. The device compresses synchronous or asynchronous data from up to eight incoming lines at speeds up to 19.2K bit/sec. It then transmits that data over one of two trunk lines capable of operating at up to 19.2K bit/sec.

The unit can be configured to have each of the two 19.2K bit/sec trunks serving a group of four incoming lines. Alternatively, the unit can be configured to have one trunk supporting eight 9.6K bit/sec

incoming lines, with the second trunk reserved as a backup.

The unit is expected to cost \$9,950 and will complement an existing four-port version.

Motorola, Inc. of Schaumburg, Ill., is expected to introduce three microwave radios capable of broadcasting digital data and voice in the 23-GHz bandwidth.

The first radio, the Digital Line Rate model, will accept a single input from an AT&T Digital System Cross-Connect (DSX) interface at T-1, T-1C and T-2 speeds. The Digital Line Rate model will also support the European equivalents of T-1 and T-2.

The firm's Digital Multi T-1 radio will accept up to eight T-1 lines that are compatible with DSX-1. The firm's Digital DS-3 model is a 45M bit/sec microwave radio.

Each of the new models features alarm monitoring and diagnostic functions. These features include front-panel LEDs, front-panel meters and rear-panel alarm outputs that can be connected to a customer's network management system. The diagnostic functions enable customers to determine if failures were caused inside or outside the radio system.

In the X.25 packet-switching arena, Amnet, Inc. of Framingham, Mass., is expected to introduce its Nucleus 7200 X.25 switch. The new product uses an IBM Personal Computer AT chassis to concentrate local X.25 traffic onto a single X.25 trunk.

Users looking for bridges to connect remote networks can also expect to see new products.

Fremont, Calif.-based Vitalink Communications Corp. is expected to announce its TransLAN V network bridge. The new unit will feature distributed load-sharing software, which enables the bridge to act as a network routing device. The firm's TransLAN product line provides a data link layer bridge between Ethernet- or IEEE 802.3-compatible networks. The new unit more effectively manages traffic crossing the bridge.

The distributed load-sharing software will be able to support traffic analysis and control. By supporting a class of service functions, the TransLAN V bridge will enable network administrators to limit the resources a local network device can access on the remote local net. The firm will provide a software upgrade that adds most of the distributed load-sharing features to TransLAN III bridges.

Vitalink will also introduce a TransLAN bridge that supports a link between remote IBM Token-Ring-based local networks via synchronous lines. With the new

bridge, users will be able to create wide-area networks based on the Token-Ring standard.

Bridge Communications, Inc. of Mountain View, Calif., is expected to unveil four new members of its Secure Network System family of products. That product line, developed by Bridge's Phoenix Technology, Inc. subsidiary, will enable Bridge products to support data encryption. It will also enable network administrators to limit devices that are able to access Bridge products.

With the Secure Network System, administrators can also limit the remote devices that can be accessed via Bridge products.

The Secure PCS/1 Personal Communications Server enables IBM Personal Computers attached to a local network supporting the Transmission Control Protocol/Internet Protocol to link to a host computer. The product, an add-on board residing in one of the networked Personal Computers, will provide terminal-emulation capabilities and let Personal Computers transfer files with the host.

Bridge will also announce three bridges employing the Secure Network System technology. The Secure IB/1 bridge links Ethernet local networks to Bridge's 5M bit/sec broadband networks. The Secure IB/2 bridge links multiple local Ethernets, while the Secure IB/3 links remote Ethernets over point-to-point leased lines. □

## ► EDUCATIONAL ADVANCES

# College tries video net

**BY JOSH GONZE**  
Senior Writer

RANDOLPH CENTER, Vt. — Vermont Technical College cut over a two-way video network last week using microwave, copper and fiber-optic T-1 facilities, extending the college's reach into a remote area.

In the network's field test this spring, instructors in a specially outfitted classroom at the main campus here in central Vermont will lecture students at a vocational high school in Newport, Vt., a town on the Canadian border.

"Currently, the problem is that we cannot offer needed continuing education and preparatory education to different areas of the state, and not everybody can come to our Randolph Center campus," said Robert Clarke, president of the college.

In addition to transmitting regular courses, the network will be used to transmit continuing education courses, school board meetings and teleconferences. If the project wins final approval from the chancellor of the Vermont State Colleges, it could be extended to as many as 16 sites around the state, according to Clarke.

The 1.54M bit/sec T-1 line used to establish the first link is leased from New England Telephone and Telegraph Co. and includes segments of digital microwave, fiber-

optic cable and conventional copper telephone wire. "It's innovative in its use of three different transmission media. It happens to employ everything that's available, other than satellite," said Dave Usher, New England Telephone's district manager for Vermont external affairs.

Course instructors will speak from a classroom specially outfitted with three television cameras and several microphones. One camera will focus on the instructor, another will display any graphics materials shown, and a third will pan the students in the classroom. Guided by a video technician in the classroom, one camera at a time will transmit over the network to two television monitors in the Newport classroom.

In the reverse direction, a single camera will focus on students in the Newport classroom for transmission to two monitors viewed by the instructor.

The network transmits screens of compressed video data at 15 frames per second, fast enough to depict slow movements within either classroom accurately, but less precise than an analog television monitor.

The video coder/decoders used in the network are Compression Labs, Inc.'s Rembrandts, which transmit only portions of the image that change from previous frames.

"The quality of transmission is

much different than the old slow-scan TV that people have usually thought of as compression technology. It's a little jerky at times, especially if there's fast movement," Clarke said, "but the lips are in sync with the dialogue."

### Graphics capability

The coder/decoders also have a graphics capability that allows a freeze-frame graphic to be transmitted to one monitor while the normal camera transmits to the other monitor.

Each coder/decoder will be directly attached to a Nynex Corp.-supplied data service unit (DSU) terminating the T-1 circuit. From the DSU in the lecturer's classroom here, several hundred feet of copper cable extend to a fiber-optic multiplexing hub New England Telephone installed previously to serve the local calling area.

The fiber cable reaches several miles to a central office switch here. From that central office, a

conventional copper circuit carries the T-1 signal to a central office in White River Junction, Vt. At that point, the signal jumps onto a digital microwave link to St. Johnsbury, Vt.

At the St. Johnsbury central office, the signal is placed on another copper cable extending to the Newport central office.

A copper local loop carries the video with its imbedded voice signals to the coder/decoder at the Newport classroom.

The 74-mile circuit costs \$3,368 per month, New England Telephone's Usher said. The Rembrandt coder/decoders cost \$78,000 each, but, for the duration of the pilot, the college has them on short-term lease from Compression Labs for \$3,000 per month, according to Gary Kemp, an account manager at the company.

Kemp estimated the cost of the audiovisual equipment, including cameras, monitors, microphones and speakers, at about \$40,000. □

# FCC order seen as boon to users

continued from page 4

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- Pro America II, 5.2%.
- Pro America III, 5.4%.
- 800 Service, 3.6%.
- WATS Service, 5.2%.
- The WATS and 800 monthly access line charges will increase 60 cents per month to reflect special access charge increases approved

by the FCC.

■ Megacom 800 rates will be cut 5.9%.

■ Software-Defined Network will fall 6.35%.

■ 800 Readyline service costs will be lowered, and new discount schedules will be added for certain high-usage customers.

■ 800 Validator rates will be reduced for all time periods.

■ Rates for the local channel portion of private lines will change slightly. They will increase or decrease depending on location. □



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## ► NETWORK INSTALLATION

# Chrysler's E-mail net goes on-line

*Auto giant links 6,500 dealers.*

BY BOB WALLACE

Senior Editor

HIGHLAND PARK, Mich. — Chrysler Motors Corp. has completed installation of an electronic mail network that enables its 6,500 dealers to receive time-sensitive sales data from the automaker's headquarters here.

Late in 1986, Chrysler contracted to provide dealers with General Electric Information Services' Quik-Comm System. Quik-Comm is a personal computer-based, two-way E-mail service. All E-mail travels over GE Information Service's worldwide value-added network.

An interface created by GE Information Services links Quik-Comm users to Chrysler's IBM Professional Office System (PROFS) network. The corporate PROFS net is used widely by Chrysler employees.

Through the GE Information Services E-mail network, Chrysler has instituted its first two-way links to 1,500 American Motors Corp. (AMC) Jeep/Eagle dealerships. Chrysler acquired AMC last August.

David Bartlow, field and zone systems manager for Chrysler, said installation of the network service was painless, and he praised GE Information Services for its help in the creation of the dealer net. "The system has performed well, and we have not experienced any downtime," he said.

GE Information Systems was chosen over MCI Communications Corp., GTE Telenet Communications Corp., Western Union Corp. and Tymnet, McDonnell Douglas Network Systems

Co. because it offered the PROFS-to-Quik-Comm interface that enables users of both systems to exchange data.

Bartlow said other bidders did not offer the PROFS interface when the contract was awarded.

According to Bartlow, Chrysler chose to connect two E-mail services, rather than simply expand the automaker's PROFS network, because the GE Information Systems offering is easier to use and requires less training.

Chrysler dealers, many of which already have IBM Personal Computers and

"This was the enhancement we needed to communicate properly with our dealers," Bartlow said.

Personal Computer XTs, insert a GE Information Systems diskette into the machine and press a single key to check their E-mail boxes. The automaker's 10-year-old Direct Information Access Link dealer system provided access to Chrysler data bases but could not handle document transmission.

"We had to send our dealers Western Union overnight telegrams informing them of incentive programs and pricing policies," Bartlow said. These telegrams did not contain detailed information. Bartlow said dealers would receive this data through the postal system.

"This was the enhancement we felt we needed to communicate properly with

our dealers," he said.

When used together, two of the system's features support rapid electronic transmission of documents between Chrysler headquarters and its dealers. GE Information Systems developed a custom forms package that enables Chrysler to send documents to its dealers.

After filling out the forms, dealers use an electronic signature to approve the document. Chrysler uses the forms package to process the data collected from the dealer forms via its mainframe.

Although use of the E-mail system is simple, persuading the dealers to accept and use the network service required careful planning. During the implementation period, Chrysler planners took several measures designed to ensure widespread use of the E-mail network service among dealers.

Bartlow's staff spent three months jetting across the country to visit Chrysler's zone offices. "The implementation is simple. You just send out the diskettes. The real test of the system is getting people to use it."

District managers at each zone office were shown how to use the system, Bartlow said. Three days after each visit, Chrysler sent the Personal Computer software to all dealers in each manager's jurisdiction. In most cases, training required little time because more than 4,000 of Chrysler's dealers already had IBM Personal Computers and were familiar with their capabilities.

Bartlow said a series of important messages was sent over the system to dealers as part of a test to gauge dealer acceptance of the E-mail network service.

"First, we sent a welcome-to-the-system message from our vice-president of sales to the dealers," he said. "Then we began sending the dealers weekly information letters on vehicle distribution and sales incentive programs."

Chrysler followed these transmissions with a series of checks to determine how many dealers read these messages. Bartlow said roughly 75% of the dealers on the system picked up the messages less than 24 hours after they were sent.

Although initially pleased with the response, Bartlow said his group has printed out a list of the dealers who read their messages and the ones who do not. "With this information we can track problems by zones," he said. ▀

## US Sprint user on hold

continued from page 1

the US Sprint services could save the company \$1 million to \$3 million this year and as much as \$20 million over the next five years, compared to the AT&T services currently used. These savings, Lack said, would be realized without suffering any degradation in call quality.

The contract calls for US Sprint to provide one plus dialing service and Dial 1 WATS for a total of 62 Sony locations across the U.S. The carrier will also supply Sony with an 18-site Virtual Private Network (VPN).

Richard Smith, president of US Sprint's National Accounts Division, estimated that the contract will represent 80% of Sony's voice traffic. The services will replace a mix of AT&T calling services, including AT&T 800, WATS and credit card services.

Lack said many of the US Sprint services were supposed to have been implemented in mid-1987. However, the carrier did not begin installing the services until last fall.

"They had problems with their switching gear in New York City," Lack explained. The switch there, which would have been used to route Sony traffic to the West Coast, was overloaded.

US Sprint resolved the problem by routing around the switch.

Lack said Sony was concerned about US Sprint's ability to meet its needs. "Until this past summer, we were unsure whether [US Sprint] would be able to

adequately serve us," he said.

Sony was also concerned about the carrier's financial problems. "We were a little hesitant to do business with them when we heard about their financial problems," Lack said. US Sprint reported an operating loss of \$282 million for the second quarter of 1987.

Lack said his group also pressed top US Sprint officials to address the service billing problems many of its large business users encountered throughout 1987. Although he would not divulge the content of the discussion, Lack said US Sprint promised to deal with the problem.

Before sealing the deal, Sony staffers visited other US Sprint users, including PepsiCo, Inc., which is a VPN customer. Lack said he was surprised to learn that VPN users were not rushing to support all their voice traffic with the virtual private network service. "These US Sprint users have taken a cautious approach to the amount of traffic they put on the VPN networks," he said.

Sony's staff performed an extensive evaluation of services offered by AT&T, US Sprint and MCI Communications Corp. before signing the US Sprint contract.

Sony participated in a pilot test in which the carrier provided test circuits.

These long-distance transmission facilities served at least one location in New England and one in California, and they were used for several weeks, he said. ▀

## NBS set to finalize tests

continued from page 2

use the network for OSI application testing, Mulvenna said. Nonmembers would need to submit a testing proposal and, if the proposal is approved, connect to the packet network.

Testing partners would be chosen or assigned by the steering committee. There is no fee for these tests, except for that charged by the packet network provider, according to Mulvenna.

Mulvenna also expects the steering committee to approve an amendment to the charter that would allow OSInet to be used for demonstration purposes. Vendors could show customers demonstrations of their products.


Currently, OSInet is set

up for testing only.

Two application-level ISO/Defense Department gateways have been developed on a Digital Equipment Corp. MicroVAX II and are slated for testing in March, Mulvenna said. The MicroVAX will run both ISO and Defense Department protocol suites, and support an E-mail and file-transfer gateway.

When sending messages or files, users will have to indicate both the address of the gateway and the address of the user they wish to reach. The gateway would then perform the necessary translations between applications.

Network Research Corp., located in Oxnard, Calif., loaned NBS the Department of Defense software, and DEC loaned the MicroVAX II and ISO software used to develop the gateway. ▀



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# INDUSTRY UPDATE

“Of the three issues affecting our industry most — government policy, the changing architecture of data processing and technological advances — government policy has by far the greatest impact. With the sweep of a pen, government can make an entire segment of the industry obsolete.

**Charlie Johnson**  
Chairman and chief executive officer  
General DataComm Industries, Inc.  
Middlebury, Conn.

## ► PACKET-SWITCHING MARKET

# Amnet fights Goliaths with savvy slingshots

*Start-up armed with OEM pacts for low-cost switch.*

**BY PAM POWERS**  
Senior Editor

FRAMINGHAM, Mass. — A few savvy alliances and a low-cost packet switch are the weapons that lilliputian Amnet, Inc. is wielding in an attempt to compete with entrenched packet-switching giants.

Only two years ago, Amnet began marketing private packet-switching networks to small and mid-sized users, and it has a negligible share of a market dominated by competitors such as BBN Communications Corp. and Telenet Communications Corp.

But the company has made great strides in recent months with the signing of three major OEM agreements, the introduction of a new packet switch hailed as powerful and low in price and a new round of financing that has swelled its coffers by \$7.25 million.

Amnet opened its doors in the early 1970s as a systems integrator, building custom packet-switching and voice-response systems for customers. In 1980, the company won a large bid for a private packet network for the Swedish air force, a project it completed in 1985.

Later that year, the company decided to enter the commercial market with its Nucleus 6000, a packet switch based on the product Am-

net custom-built for the Swedish air force.

The Nucleus 6000 was installed at a number of user sites in 1986, according to Robert Rosenbaum, Amnet vice-president of marketing. The company will not release financial information or details on product shipments.

Despite its infiltration of the market, Rosenbaum said, Amnet faced two critical problems. “We were a small company trying to sell a high-level system. We couldn’t offer the hardware support that our larger competitors, such as BBN, Tymnet and Telenet, could offer.”

In addition, Amnet, like its competitors, sold packet switches based on proprietary hardware, which Rosenbaum said is an expensive way to do business. “Using proprietary hardware meant having large inventories and expensive hardware. We didn’t have the cash to do business that way,” he said.

As a result, Amnet developed a two-pronged strategy to compete in the private packet-switching market.

The first step was to introduce a new packet switch, the Nucleus 7000, that would support low- to mid-level communications needs with high-level features at an unprecedented savings.

The switch, which is based on an IBM Per-  
See page 12

## ► WESTERN UNION

# WU revamp plan gets final OK

**BY PAM POWERS**  
Senior Editor

UPPER SADDLE RIVER, N.J. — Against what many said were insurmountable odds, Western Union Corp. recently completed the steps necessary to effect its proposed restructuring, narrowly avoiding bankruptcy.

Western Union will now be controlled by an investor group headed by private investor Bennett LeBow, who first proposed the restructuring plan more than a year ago. According to the plan, LeBow will merge Western Union’s Telex operations with the international Telex operations of ITT Corp. ITT’s business, based in Secaucus, N.J., employs about 500 people, most of whom, reportedly, will be relocated here when the two operations are consolidated.

In order to go ahead with the restructuring plan, which was the company’s sole re-

maining alternative to filing for bankruptcy, Western Union had to obtain approval from 80% of its shareholders. The company also had to convince 80% of its debtholders to swap their debentures for issues in the new company and raise \$500 million through its investment banker to eliminate some of its debt and to pay for the ITT telex business.

Western Union had to postpone several times the deadline for debtholders to exchange their shares and also several times postponed its shareholder meeting. Analysts said those holding interests in the company lacked faith in the restructuring plan.

After finally winning shareholder approval in the waning days of 1987, Western Union put a final deadline on the debt exchange, sweetening, for the third time, its offer to debtholders and reducing the required compliance from 80% to 69%.

Last week, the board of directors voted on a proposal to install Robert Amman, an associate of LeBow, as Western Union’s chief operating officer. The results of that vote were not available at press time.

Amman declined to be interviewed for this article, but published reports have quoted him saying he expects to make Western Union profitable by 1989 with the aid of cost-cutting measures. Amman is quoted as saying he would eliminate more than 500 jobs between ITT’s and Western Union’s operations, where analysts predict a considerable amount of overlap.

Attaining profitability by 1989 would be no mean feat for the company, which has posted losses as least as far back as 1983. For 1986, the company reported a loss of \$531 million, including a \$441 million write-down of assets, on revenue of \$220 million. □

## ► STRATEGIC PACTS

# Micom set for Amnet alliance

**BY PAM POWERS**  
Senior Editor

SIMI VALLEY, Calif. — Micom Systems, Inc. will announce a strategic alliance this week with packet-switch vendor Amnet, Inc., in another move that reflects the company’s aggressive push to establish itself as a systems vendor.

Separately, the company recently responded to a suit brought by Republic Telecom Systems Corp. in December with a countersuit charging Republic Telecom with attempted monopolization of the voice-encryption market.

The move to resell Amnet’s high-performance packet switch follows closely on the heels of Micom’s purchase of Spectrum Digital Corp., a high-end T-1 multiplexer company.

Both deals reflect Micom’s attempts to refurbish its image, which has been that of a components company in a market that has adopted a systems and networking outlook for communications.

Douglas Hill, Micom’s director of strategic marketing, described Amnet’s product as a mid-range switch that processes up to 300 packets per second.

Under the OEM agreement, Micom will purchase the software from Amnet and use it on its own hardware. Hill said the switch, which Micom calls the DNP, is available immediately.

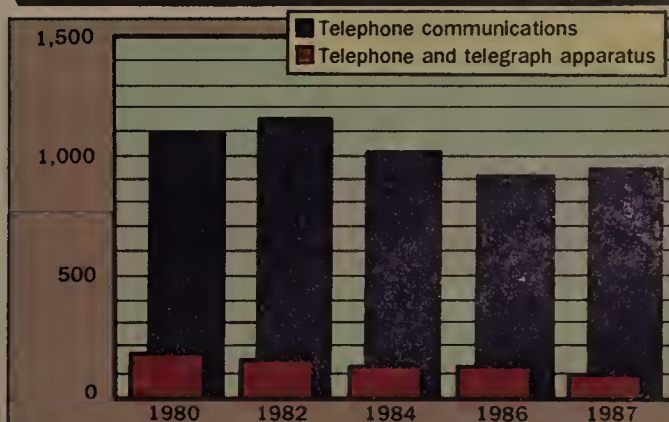
Micom will resell Amnet’s Nucleus 7000 packet switch along with its own packet assembler/disassemblers and packet concentrators through its direct sales force.

“Our attitude is, we’re selling our packet products as a network,” Hill explained.

Toward that end, the company has been working in recent months to strengthen its direct sales force, which currently numbers 50 people.

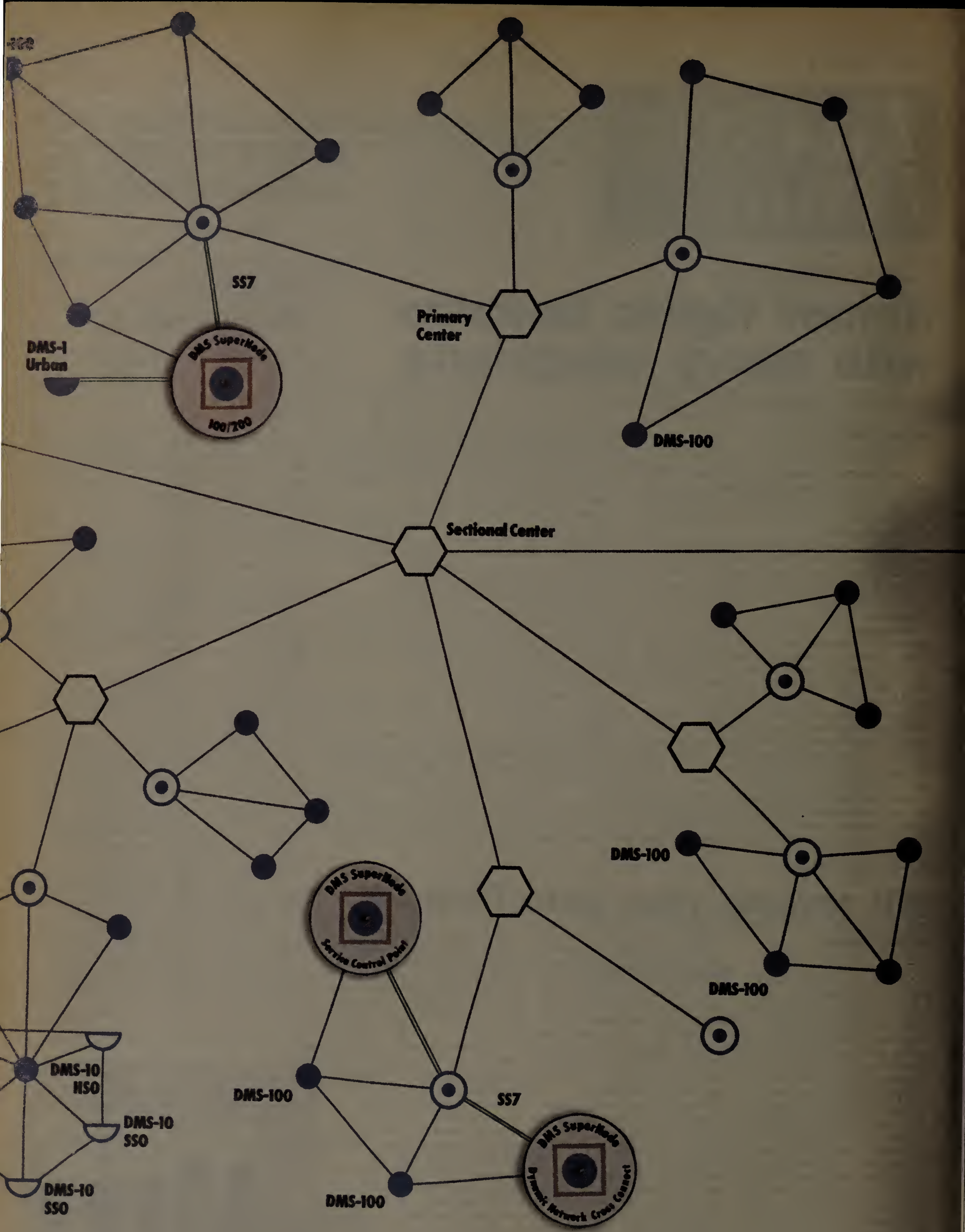
See page 12

## Communications industry annual employment



▲ Employees (in thousands)  
in the first nine months of 1987, the communications sector grew 1.3% from 881,400 to 892,700 workers.  
SOURCE: U.S. BUREAU OF LABOR STATISTICS, WASHINGTON, D.C.







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# NETWORKING



## Micom set for Amnet alliance

continued from page 9

"We have recently added T-1 and packet-switching specialists to the sales force, in addition to support people," he said, "and we've worked to refocus the staff toward a systems-oriented sales approach."

As part of the acquisition of Spectrum Digital, Micom appointed former Spectrum President and Chief Executive Officer Jay Pisula to the position of president of Micom's sales division.

"Pisula is a real systems sales type of professional. He will be a great help to the staff," Hill said.

Analysts expressed optimism that Micom will gain a foothold in the systems business, although some said the company is tardy in its entry to the high-end networking business, where a number of packet-switching and T-1 multiplexer vendors have already staked their claims.

Jerry McDowell, president of the Carmel Valley, Calif.-based McDowell and Associates, a communications consulting firm, was bullish on Micom's prospects. "Micom has built a very strong in-house sales force, and I think they'll have no problem selling the Amnet switch. Micom understands communications protocols, which is what you need to succeed in selling a packet switch network."

On another front, Micom is battling the competition in court.

In its recent countersuit against Republic Telcom, Micom is claiming Republic Telcom attempted to monopolize the nascent market for voice encryption.

Micom's countersuit, filed in the U.S. District Court for the North-

ern District of California, seeks more than \$2 million in damages.

In the original suit brought by Republic Telcom in December, the company alleged that Micom copied a copyrighted technology developed by Republic Telcom and Centigram Corp.

Republic Telcom charged that two of its former employees now working for Micom used the Advanced Speech Compression technology developed for Republic Telcom's RLX series of trunk expanders to develop Micom's Oneliner compression technique, dubbed Advanced Packetized Voice (APV).

The APV technology packetizes voice to enable the transmission of multiple, simultaneous voice channels over a single 56K bit/sec line.

Micom said the product is used by mid-sized users that transmit at rates below T-1 over leased lines and by large users that use the product as a feeder to backbone T-1 networks.

Currently, Micom and Republic Telcom are the only two companies that sell voice encryption products for use over 56K bit/sec lines.

In its countersuit, Micom charges that Republic Telcom's "sham litigation" is intended to interfere with Micom's ability to compete with its Oneliner product. Republic Telcom has attempted to monopolize voice and data integration in the sub-T-1 market, Micom charges.

Republic Telcom's RLX product line, first shipped in spring of 1986, is sold directly to end users and to Timeplex, Inc. as part of a resale accord. A Republic spokesman said revenue for the RLX line, which contributes over 80% of the company's total sales, is estimated to be about \$9 million in 1987. □

## BRIEFS

**Hughes Network Systems, Inc.**, formerly M/A-Com, Inc.'s Telecommunications Division, signed a contract with **Telesat Canada** to provide the satellite communications services company with very small aperture terminal satellite equipment for its new Anikom 200 public network service.

The contract also calls for the codevelopment of network software to support additional applications over the public satellite network.

In a separate deal, Hughes Network Systems was awarded a three-year contract with **SOL Telecommunications Services, Inc.**, a communications engineering firm, for the provision of up to 100 Gemini VSAT terminals.

The VSATs will be used on a high-speed data communications network built for the Defense Communications Agency.

SOL will use the Gemini equipment to provide high-speed links among remote Agency sites.

**Science Applications International Corp. (SAIC)**, a diversified company with holdings in high technology, signed an OEM agreement with Hughes Network Systems.

Under the contract, SAIC, acting as a systems integrator, will sell Hughes' Gemini equipment for video teleconferencing to government and other large commercial customers.

SAIC's first customer will install a five-node Gemini network linking sites in Arizona, California and Virginia.

The network will allow trans-

mission of 56K bit/sec video. In addition, it will allow any of the five sites to receive or host video teleconferences over the same frequency.

**International Mobile Machines Corp.** awarded a second contract to Hughes Network Systems for the provision of 60,000 subscriber units for wireless digital telephone systems.

**NEC America, Inc.** last week said it signed a multimillion-dollar contract with **GTE Spacenet Corp.** Under the contract, NEC will supply its VSAT equipment for sale as part of Spacenet's Skystar shared and dedicated data and video networks.

Spacenet will purchase Ku band VSATs, hub baseband equipment and satellite software from NEC, which is manufacturing the equipment from its Hillsboro, Ore., facility.

**ISOETEC Communications, Inc.**, a maker and distributor of telephone systems, recently posted significant increases in revenue and earnings for its fiscal third quarter ended Sept. 30, 1987.

Revenue increased to \$26.1 million, as compared with \$15.8 million for the corresponding quarter in 1986.

Earnings increased to \$2 million, up from \$316,000 last year.

In December, ISOETEC agreed to merge with **Vodavi Technology Corp.** and to acquire **Contel Corp.**'s ailing Executone division.

The moves are representative of continuing consolidation in the telephone systems market. □

## Amnet fights Goliaths with savvy

continued from page 9

sonal Computer AT, offers high-level functionality at a low price, Rosenbaum said. "A PC AT with a 286- or 386-based processor offers a hell of a lot of horsepower in a little package," Rosenbaum said.

Equally important, from Amnet's perspective, a Personal Computer AT-based switch frees the company from hardware manufacturing costs.

"This way we can concentrate our resources on software development, which is 90% of the switch's value in the first place," Rosenbaum said.

A Personal Computer AT-based switch with lower port capacity also addresses a packet market segment that until recently was virtually ignored — the mid-sized to low-end user who cannot cost-justify the traditional high-end packet switch.

"With this product, the actual cost of equipment has come down by a factor of 10," Rosenbaum said. "A four-port node costs less than \$8,000. That's practical for the smaller user."

And unlike switches based on proprietary hardware, support for a Personal Computer AT-based

switch is minimal. "Higher end switches require large maintenance and support crews, but everyone knows how to operate an AT," Rosenbaum said.

Since its introduction in February 1987, the Nucleus 7000 has been installed at 10 user sites. But despite the competitive features of the switch, Amnet still had to wrestle with giant players that were far better equipped to sell to and support private network customers.

As Jack Freeman, a senior analyst with the Boston-based market research firm The Yankee Group, said, "Good switches come a dime a dozen now. Amnet's still up against some heavy competition."

Thus emerged the second part of Amnet's strategy: to create an end-user sales channel but place primary emphasis on the sale of networks through alignments with other vendors.

In recent months, Amnet has signed at least three OEM agreements with "major data communications companies with revenues of more than \$100 million," Rosenbaum said. Although Amnet would not divulge the name of the ven-

dors, a source close to the deal said arrangements have been made with **Gandalf Data, Inc.**, **Racal-Milgo, Inc.** and **Micom Systems, Inc.** Micom is expected to announce its liaison with Amnet this week (see "Micom set for Amnet alliance," page 9).

Rosenbaum confirmed that the OEM agreements are with companies that sell modems and statistical multiplexers. He acknowledged the recent trend for statistical multiplexer vendors to team up with packet-switch companies. Demand for high-end statistical multiplexers is leveling off, he observed, forcing those vendors to seek revenue growth through other channels.

"Users are putting more intelligence at remote sites, which means they now need dynamic rerouting, fault tolerance, network management and a standard interface that can combine several types of traffic onto one network," Rosenbaum said. Packet switching, he said, provides that, while statistical multiplexer networks do not.

The OEM arrangements with **Racal-Milgo**, **Micom** and **Gandalf**, therefore, provide those companies with another technology through which they can expand their installed base of customer networks.

For Amnet, the agreements are equally advantageous, as they provide a small, unestablished company with an entree to a large number of customer accounts.

But Freeman said, "I strongly suspect Amnet will never gain any meaningful share of the market [through its OEMs]. There isn't much of a place for statistical multiplexer vendors like Gandalf and Racal-Milgo against strong packet-switching vendors, although Micom is making an aggressive push there."

Given the recent rash of mergers and acquisitions in the industry, it is not unlikely Amnet will be acquired by one of its OEM customers or by another networking vendor seeking packet-switching capabilities. But Rosenbaum said Amnet "is not looking to be bought," and he is confident it can succeed through strategic alliances.

A new round of private venture financing, completed in December, will assist Amnet's efforts to make it on its own. Rosenbaum said the money will be used for research and development projects and for further marketing. "We need to expand our OEM channels and to get our name out there," Rosenbaum said. "Unfortunately, that costs money." □



# TELECOM TRENDS

## AT&T requests International 800 additions

AT&T has asked the Federal Communications Commission for permission to add new countries to the list of those in which it offers toll-free International 800 Service.

AT&T asked that the service be offered to Finland and Israel from the mainland U.S. and Hawaii. In a second proposal, the carrier requested that the calling service be offered to Hawaii from Finland and Israel. If approved, the International 800 Service would become available on Feb. 12.

### ► AUTOMAKER CONTRACT

## Chrysler plan for cabling follows trend

BY BOB WALLACE  
Senior Editor

AUBURN HILLS, Mich. — Chrysler Corp. is evaluating bids for a 10,000-station private branch exchange, along with a uniform cabling system, to be installed at its advanced engineering facility here.

The Chrysler Technology Center will be outfitted with a digital PBX that will switch voice, data and video, and a twisted-pair wire/fiber-optic cabling system. The value of the contract, due to be awarded in March, could reach \$12 million.

Chrysler separated the cabling system portion of the project from the request for proposal and sent it to vendors specializing in the design, implementation and certification of cabling systems.

The automaker is one of a growing list of users that have chosen this option. Users say cable contractors bring more expertise to cabling projects and often charge less than PBX vendors for this work.

Kim Kimel, telecommunications planner for Chrysler, said the company has hired a communications consultant to assist in the cabling system development and evaluation processes. "We specified in the RFP that the PBX vendor work with the company installing the cabling system," she said.

Kimel said sending the cabling system work out as a second RFP would increase the level of competition for that part of the project. "This also gives us the ability to evaluate this marketplace and seek more advanced solutions than those available from PBX vendors," she explained.

Chrysler is assessing the need for such optional PBX features as voice mail, centralized systems management options and on-line telephone directories. The switch may also be used as the hub of an electronic tandem network at a later date.

Kimel said the large PBX will have to be versatile. The PBX, which may grow to serve 15,000 stations within five years, will likely be used to support direct access to local and remote computers until data-switching equipment is installed in the building.

"If an end user wants access to a Cray supercomputer somewhere, we will give the end user access through the PBX," Kimel said. "That way the end user doesn't have to wait. They will be quick and dirty connections, but they will work."

The telecommunications planner said the company is currently evaluating bids that feature switches made by AT&T.

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### ► ANALYSIS

## Automakers on road to new and updated nets

BY BOB WALLACE  
Senior Editor

The three top U.S. automakers are hard at work building new nationwide nets and consolidating current networks where possible.

General Motors Corp., with the assistance of systems integrator subsidiary Electronic Data Systems (EDS), is building a multitiered, digital voice network that currently comprises roughly 600 private branch exchanges.

But getting GM net planners to work with their EDS counterparts made this undertaking

more of an adventure than a job.

Squabbling among the heads of the two companies added a new and counterproductive dimension to the gargantuan network installation effort.

Ford Motor Co. has been spared the political infighting that threatened to slow implementation of its archrival's network. Ford is quickly shedding the networks on which it once relied heavily for voice and data communications.

In the fall of 1985, Ford dumped AT&T's Net 1000 service, a value-added network service

See page 14

### ► DEMOCRATIC CONVENTION

## BOC revs for political meet

*Southern Bell readies Centrex, fiber system.*

BY BOB WALLACE  
Senior Editor

ATLANTA — Southern Bell Telephone and Telegraph Co. will install 712 miles of fiber-optic cable, rewire much of the Georgia World Congress Center and provide 9,000 lines of analog Centrex service for members of the media who will be covering the Democratic National Convention here.

The Bell operating company will create a special 800 exchange for the lines of Centrex service to be used by an estimated 25,000 people participating in the event, which is scheduled to take place July 18-21.

Those using the central office-based service will have to dial only four digits to reach others served by the same exchange.

The Democratic National Convention Committee and an organization known as Atlanta 88 issued a request for proposal for the network last fall.

Southern Bell and BellSouth Systems Technology teamed up to beat out several other competitors for the multimillion-dollar project.

Southern Bell spokesman Richard Miles would not identify the other bidders for the project.

Miles said a single central office switch in Southern Bell's Courtland St. building will provide the BOC's ESSX Centrex service to the Georgia World Congress Center.

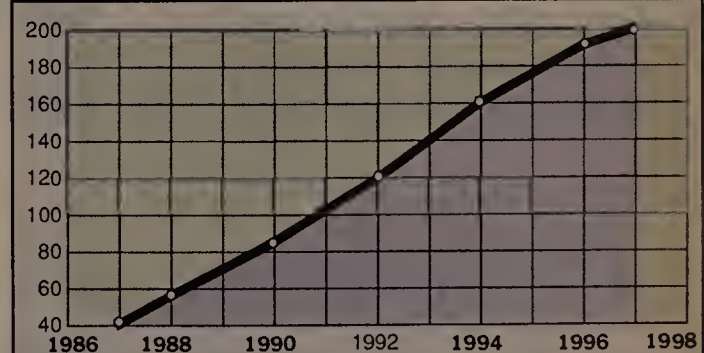
Several miles of twisted-pair wire will have to be installed in the center.

Southern Bell will also install a fiber-optic cable system linking the Georgia World Congress, the Omni Coliseum convention complex, many of the city's major hotels and other news sites.

Miles said the fiber-optic cable will also link the convention center to several local satellite

See page 14

### Proliferation of teleports in the U.S.



▲ Number of teleports

A teleport is a satellite earth station complex, usually located in a large metropolitan area. It provides direct land links to customers in that region.

SOURCE: FROST & SULLIVAN, INC., NEW YORK

### ► DIGITAL DATA SERVICES

## ITT 56K data service debuts

SECAUCUS, N.J. — ITT Corp.'s long-distance telephone division recently announced the availability of high-speed digital data service to its private-line customers.

U.S. Transmission Systems, Inc.'s 56K bit/sec digital data facilities will be available in 15 U.S. cities. Local digital data service connections will be provided in conjunction with AT&T's Dataphone Digital Service (DDS), supplied by the Bell operating companies.

The carrier said users subscribing to the service will pay a flat monthly fee based on mileage between the two cities and the cost of the local DDS facilities. The charge will average \$2,500.

The 56K bit/sec service is available in New York, Chicago, Atlanta, Dallas, Los Angeles, San Francisco, Washington, D.C., Miami, Newark, N.J., Sacramento, Calif., Jacksonville, Fla., and Orlando, Fla. The service is also available in Boston, Cincinnati and San Diego. ITT said it would add two or three cities to the list every few months. □



## BOC revs for political meet

continued from page 13  
uplink facilities.

The lightwave route will stretch north and south of the convention center. Spurs from the cable will reach east and west.

The fiber-optic system will transmit voice, data and video signals.

BellSouth Systems Technology has been named the preferred provider of telephone equipment for the project.

It will provide single-line telephone sets manufactured by Comdial Corp. in addition to multibutton telephone stations that are built by Tadiran Electronic Indus-

tries.

The telephone sets will work with Southern Bell's Centrex service. A BellSouth Systems Technology spokeswoman said the company will also provide the necessary auxiliary gear needed for the project.

That equipment will be installed in several of the facilities to be used by the Democratic National Convention members.

Southern Bell's Miles said all vendors participating in the Democratic National Convention project had achieved a high level of cooperation.

"Companies that are usually adversaries are working together to ensure that everything goes smoothly," Miles said. □

## Automakers on road to new nets

continued from page 13

the carrier discontinued months later. Net 1000 was originally envisioned as a customer-programmable, packet-switched network capable of providing protocol conversion services.

The automaker's Fordnet 2 plans call for a nationwide voice/data T-1 network. The creation of Fordnet 2 is expected eventually to replace much of Ford's AT&T Enhanced Private-Switched Communications Service (EPSCS) network. GM has already replaced its EPSCS net.

Chrysler Corp. is aiming to consolidate its voice network with that of American Motors Corp., which Chrysler acquired in August 1987. The fact that both automakers are headquartered in Southeast Michigan and have sales offices and parts depots in the same geographic regions should simplify the task.

Both Ford and Chrysler are large Centrex users. Michigan Bell Telephone Co. provides Ford's world headquarters in Dearborn, Mich., with several thousand lines of Centrex from a Northern Telecom, Inc. digital central office switch.

The Bell operating company serves Chrysler's operations with analog Centrex from an AT&T 1AESS central office switch.

Although GM, Ford and Chrysler currently operate extensive nationwide voice networks, their data networks are far larger, and they require vast amounts of bandwidth to support computer-aided design and manufacturing applications.

Page Montgomery, vice-president of Economics & Technology, Inc., a Boston-based consulting and research concern, said the automakers may be the largest users of T-3 services.

These offerings operate at just under 45M bit/sec, and they offer users the equivalent of 28 T-1 channels.

Tying dealerships in all 50 states to their headquarters in Michigan has required a great deal of planning, review of network alternatives, careful vendor selection and implementation time.

Since data traffic from auto dealerships to corporate headquarters is sporadic, automakers such as Chrysler, which is a large Tymnet, McDonnell Douglas Systems Co. user, have used public value-added network services in order to handle it.

In the fall of 1986, GM revealed its plan to build a feature-rich net-

work to serve more than 5,000 Chevrolet division dealers. The network, known as Total Information Management Systems (TIMS), will offer dealers on-line access to data stored in almost all Chevrolet- and GM-maintained data bases.

With TIMS, which EDS is building for GM, any dealer equipped with a personal computer can receive data downloaded from any of Chevrolet's 22 branch offices.

EDS wrote custom software for the system that specifies the manner in which data is displayed on the personal computers.

All three automakers, and others such as Nissan Motor Co., Ltd., actively participate in the Automotive Industry Action Group, a vertical industry group that champions the use of electronic data interchange (EDI) systems tailored to its members' specific needs. EDI is viewed as the technology that will facilitate true intercompany networking and slice corporations' data communications costs.

Although many hesitant users wait patiently for high bandwidth service prices to drop, Ford and Chrysler have both embraced videoconferencing technology.

Ford buys time from Private Satellite Network, a New York-based video services vendor, while Chrysler has chosen to run its video application over its C-band satellite network.

The automakers have already dedicated many years of research and development work toward the creation of more efficient and flexible factory floor networks. GM has long carried the Manufacturing Automation Protocol banner and has already installed these broadband networks in several of its plants.

Ford has also spent large amounts of time and money on the MAP program and has already implemented a MAP-based factory floor network in its Rawsonville, Mich., plant.

The automaker's factory networking efforts, however, have not been restricted to MAP. In June 1986, the Ford Body and Assembly division announced a joint development project with IBM. The project was designed to enable plant floor Personal Computers to communicate with one another over a single channel of its Wayne, Mich., broadband plant net.

In October 1986, Ford signed a multimillion-dollar contract with Allen-Bradley Co. to design, install and certify broadband networks in 23 of its manufacturing plants. □



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## Chrysler plan follows trend

continued from page 13

Northern Telecom, Inc. and IBM/Rolm Systems Division. Kimel said a few vendors submitted multiple bids, but she would not reveal details of the proposals.

Kimel said the automaker is in the middle of a long-term project designed to optimize Chrysler's

three main communications networks.

The company operates a large IBM Systems Network Architecture network, a three-node electronic tandem network, as well as packet-switched data network services provided by Tymnet, McDonnell Douglas Network Systems Co. "We want to know if there are any areas where these networks overlap," Kimel said. □

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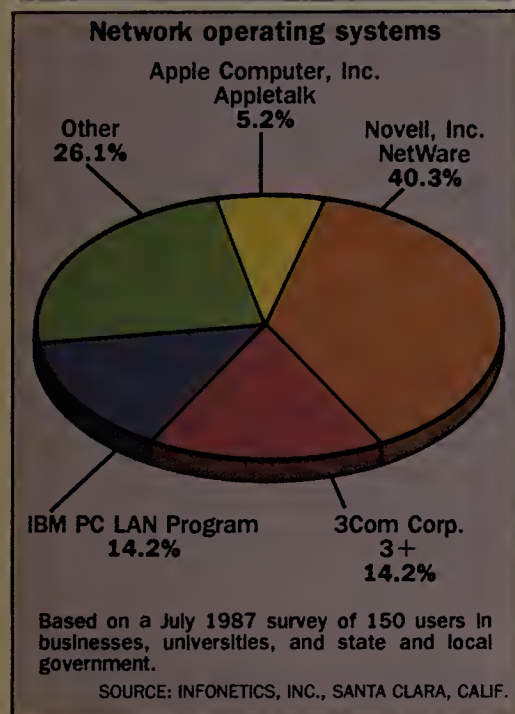
# LOCAL NETWORKING

“OS/2 in a network file server is not a good solution because it isn't designed to simultaneously handle all the tasks a network server should support. A better operating system for a network server is something that is multiuser, multitasking and allows communications tasks to be added easily as device drivers. The only industry standard that does that today is Unix System V.

**Greg Boyd**  
Vice-president  
I-LAN

A Worthington, Ohio-based value-added reseller

## User purchasing plans



## FACTORY AUTOMATION

# GTE's net saves \$10m

*Fiber-optic Ethernet yields bonus applications, efficiencies.*

**BY PAULA MUSICH**  
Senior Editor

NORTH LAKE, Ill. — When GTE Communications Systems installed its first Ethernet factory network in 1983, it hoped to reduce software design costs.

But since then, the company has saved more than \$10 million using the network to support other, unforeseen manufacturing applications.

Initial cost savings at the GTE facility, which manufactures central office switch equipment, re-

sulted from eliminating redundancy between two software design groups that had been working independently on two Digital Equipment Corp. PDP-11 minicomputers.

Linking the minicomputers with a fiber-optic Ethernet was so successful in reducing duplication of effort between the groups, "We started looking at linking other existing machines and other new machines we purchased," said Regis Snyder, a supervisor in manufacturing computer systems and software development.

"We found all kinds of things we

could do with the network that we hadn't thought about, like direct data transfer, enabling engineers at their desks to analyze situations on the factory floor without having to go out and manually collect numeric data," he explained.

Now the factory network typically carries 150G bytes of data in a normal shift. Information transported includes data about printed circuit card designs, which are passed from design to test and manufacturing communities. "We move very large CAD data base ele-

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## FILE SERVERS

# DSC Nestar multitask OS debuts

**BY PAULA MUSICH**  
Senior Editor

SAN JOSE, Calif. — DSC Nestar Systems, Inc. last week unveiled a multitasking operating system for its PlanStar and Plan series of file servers.

The StarPlus network operating system provides several performance advantages over Nestar's current single-tasking operating system, including the ability to access up to 1.5M bytes of cache memory. The new memory capability enables servers to improve throughput.

StarPlus is compatible with Releases 5.0, 6.0 and 7.0 of the existing system and with all revisions of MS-DOS.

The new system, which operates with Arcnet and token-ring networking schemes, also supports IBM's Network Basic I/O System networking protocol. The StarPlus system includes communications support for IBM Systems Network Architecture protocols, asynchronous links and X.25 wide-area networks.

### Pricing information

The new network operating system is available now and is priced between \$3,500 to \$5,000 as an upgrade for existing customers.

The StarPlus system can also be bundled with the PlanStar server for new customers for a cost of \$9,600. □

## LANMARKS

PAULA MUSICH

# The stuff of which '88 will be made

**A**nother year has come and gone with lightning swiftness, and it's time to dust off the local net crystal ball and see what issues and events will shape the industry in 1988.

Oddly enough, the biggest issues of 1988 will focus primarily on cabling and hardware issues, despite the current emphasis on networking software.

Just when you thought the industry was mature enough to deal with the real stuff of which connectivity is made, the hardware debates threaten to come roaring back.

One of the first will be the great Ethernet-over-nonshielded-twisted-pair debate. Watch for a major brouhaha in the IEEE 802.3 10BaseT study group concerning the most appropriate interface between telephone-type wire and Ethernet network interface devices.

3Com Corp. maintains that the difference between what it and Digital Equipment Corp. are proposing — compared with companies like Hewlett-Packard Co. and SynOptics Communications, Inc. — is a nonissue. Others disagree.

The debate involves vendor self-interest and is driven by the belief that there is great user demand for the technology.

The demand expectations are based on the assumption that it will be cheaper to use existing telephone cabling for local net-

works than new cabling.

This may not be the case, however, for users with a spaghetti mess of telephone wire in their walls.

But even if the installation costs between traditional wire and telephone type are a wash, attempting to save the company money looks good to the people who count.

Other major issues to be contested in 1988 will include the Ethernet vs. Token-Ring Network debate. The IBM Token-Ring Network will gain substantial ground on Ethernet this year with the installation of large Token-Ring Networks, many involving thousands of Personal Computer connections.

Also expect to hear about emerging LU 6.2 applications — developed primarily by the user companies themselves — running on top of those networks.

In addition, watch for AT&T to announce its own Ethernet, or at least plans to resell someone else's Ethernet for a higher speed supplement to the 1M bit/sec Starlan.

In the factory networking arena, Baltimore will be the place to be this summer to watch Manufacturing Automation Protocol 3.0 products bloom.

The MAP/TOP users group's Enterprise Networking Event, if everything goes according to schedule, will provide the big bang needed to get the stalled

MAP movement moving again.

Fiber, especially for high-speed applications, may finally come into its own this year. With the availability of Fiber Distributed Data Interface (FDDI) chips and products driving down the cost of FDDI networks, and an increase in installation costs for other media, the use of fiber will likely increase.

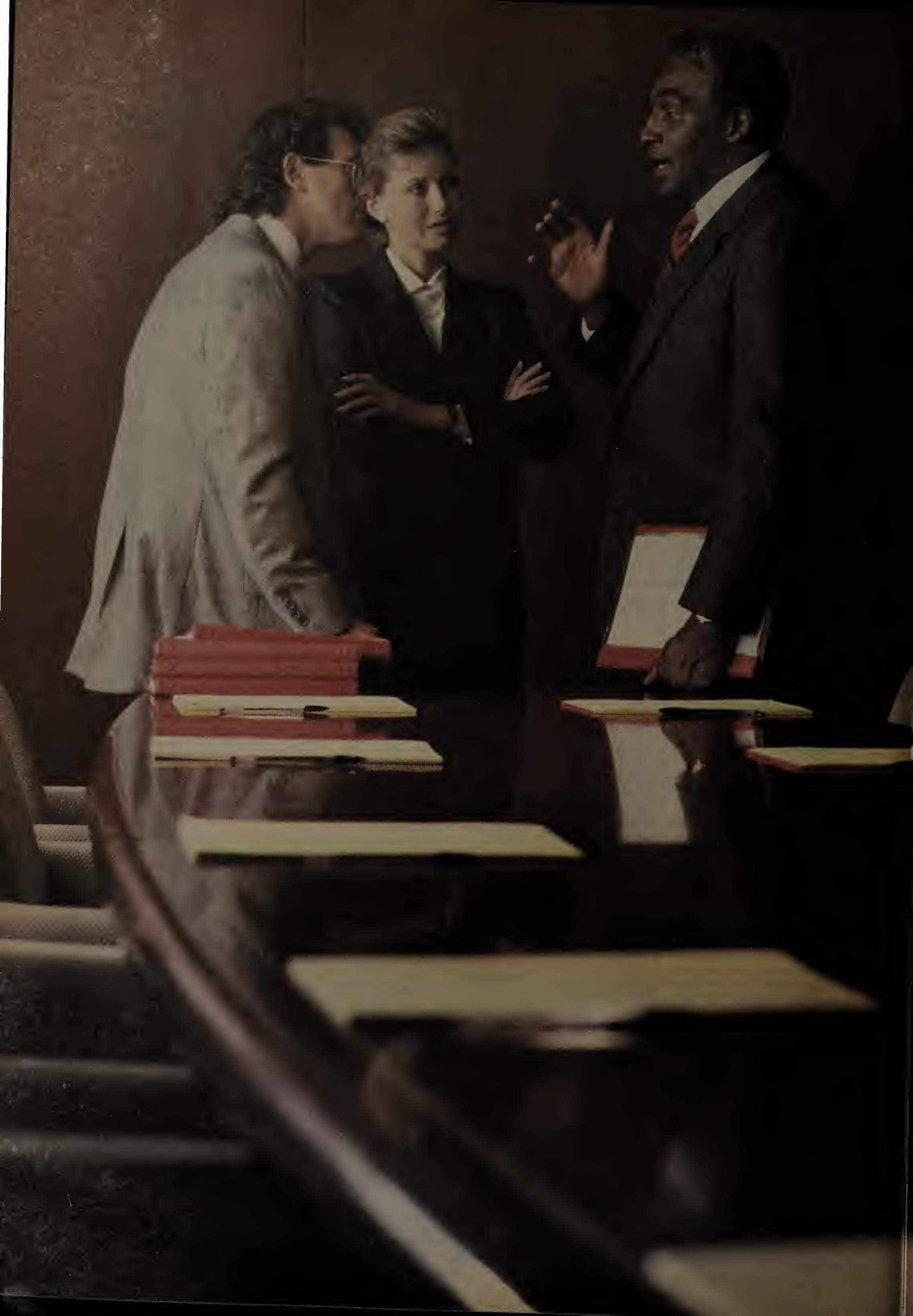
In lower speed applications, fiber will be held in check by users anxious to try out the Ethernet-over-nonshielded-twisted-pair products, especially with Digital Equipment Corp. pushing such products.

Finally, the one major software issue to be debated during 1988 will focus on the impact of OS/2, Microsoft Corp.'s LAN Manager and IBM's LAN Server on the local networking market.

This impact, however, will not become readily apparent until late in the year. It will take delivery of these products into users' hands as well as delivery of networking applications written to OS/2 and the LAN Manager before any impact will be felt or understood.

Delivery will likely take longer than vendors expect. In addition, users in large organizations will take their time evaluating the utility of OS/2-based network operating systems and networking applications before they decide how and where they will use the programs. □



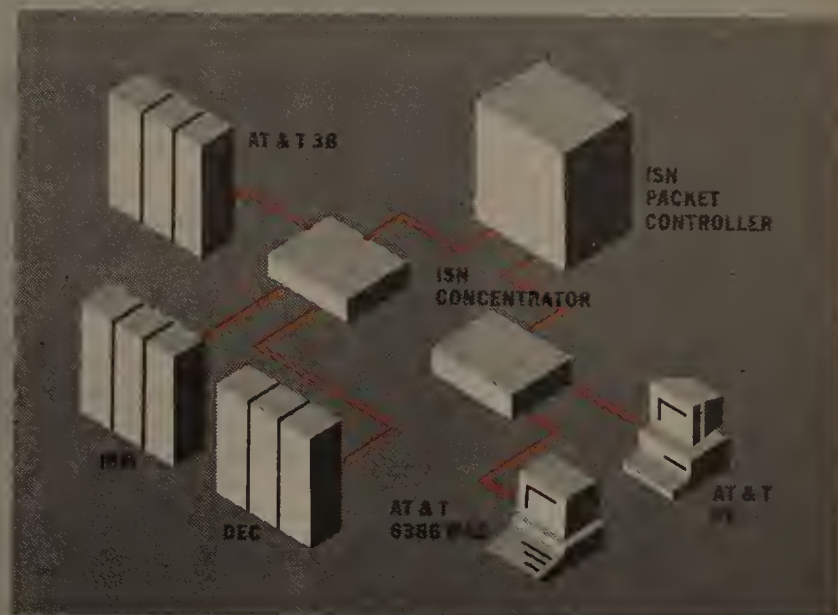




*“Our Executive Committee doesn't have a clue how fast computers change.”*

*The Executive Committee people we spoke to off-line don't realize that they're placing a long-term bet on the computer network we choose today. They look at computers in their own shop and figure networks are just the wires that connect them. So before Gail gets into AT&T's ISN, I'll get them thinking. Looking across the table at the guy who's got a DEC<sup>®</sup> or an IBM system and saying 'Hey, we need a network that can work with just about anybody's boxes. And still be here after some of those boxes are history.' Then Gail presents ISN, chapter and verse. Finally, you get up and remind them of what AT&T's done for us. Our committee may not know computer networks, but they sure know*

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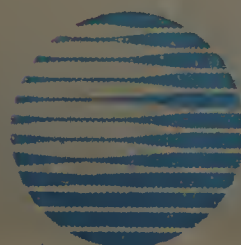
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## GTE's net saves \$10m

continued from page 15

ments from one node to another," Snyder said.

In expanding the network to support a larger number of manufacturing applications, GTE designed a three-tiered hierarchical network based on Codenoll Technology Corp.'s Code-star passive-hub network. At the top of the hierarchy

is an IBM mainframe, which now serves as a repository for raw CAD data bases and scheduling information, as well as several DEC minicomputers.

The mainframe is channel-attached to an Interlink Computer Sciences, Inc. gateway, which interconnects the IBM mainframe to

nine VAXes and six PDP-11s. The minicomputers serve as computer-aided manufacturing hosts.

The second level of the hierarchy is made up of cell controllers — PDP-11/73s or MicroVAXes — that communicate with factory floor devices, such as robots and automatic vision inspection systems. Such factory floor devices make up the third level of the hi-

erarchy and are generally connected to the network via the cell controllers.

Each PDP-11 and MicroVAX is connected directly to the star-shaped fiber network "like a spoke in a wheel, with one connection from the spoke going to the network gateway for communication with the IBM host," Snyder said.

Three types of networking protocols exist on the

same fiber cable: DECnet, Transmission Control Protocol/Internet Protocol and Xerox Network Systems. Subnets running the different network protocols communicate using gateway software on one of the nodes.

GTE chose fiber optics because it was cheaper than standard Ethernet coaxial cable — \$5 per meter vs. \$15 — it was lighter and easier to work with, and it promised greater immunity to electromagnetic and radio frequency interference generated by arc welders and other heavy machinery, Snyder said.

GTE chose to use Ethernet rather than a Manufacturing Automation Protocol-based token bus net because there were few complete MAP product lines available when the networking projects began. Snyder said that, despite Ethernet's use of a non-deterministic access scheme, which makes timing less precise for production line processing, GTE was able to make up for the difference by making hardware and software adjustments.

### Speeding production

Without the network, getting information on the manufacturing process from the IBM mainframe to the factory floor took as long as a week. By controlling the information transfer from factory floor devices connected to the network, that process now takes two minutes, Snyder said.

By eliminating such delays in the manufacturing process, GTE was able to reduce inventory requirements, give designers more time up front to design better products and reduce the number of positions required for certain jobs in the factory.

In linking inventory control and job demand systems, GTE was better able to predict how much inventory is needed to sustain the production process. Because GTE can track inventory levels more closely, it was able to reduce inventory from \$225 million to \$48 million.

"We're trying to take long lead time activities out of the production process and give that back to the R&D community," Snyder said. "If we can release a job to manufacturing in a day, when it used to take seven days, we can take the six days' savings and give it to the design groups, so they have more time to come up with better designs, and do it right the first time," he said. □

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# DATA DELIVERY/ NET MANAGEMENT

## ► HMO NETWORK

## Maxicare cuts costs via T-1, voice compression

BY JOSH GONZE  
Senior Writer

LOS ANGELES — Combining T-1 brawn with a seldom-used voice-compression technology, Maxicare Health Plans, Inc. has slashed its communications costs with a coast-to-coast network for voice and asynchronous data.

In 1985, Maxicare, a large health maintenance organization (HMO), embarked on a network construction program using leased and

private microwave T-1 circuits and T-1 multiplexers from Timeplex, Inc. The network grew rapidly in 1986 and 1987 to its current size of 18 regional hubs fed by dozens of smaller sites.

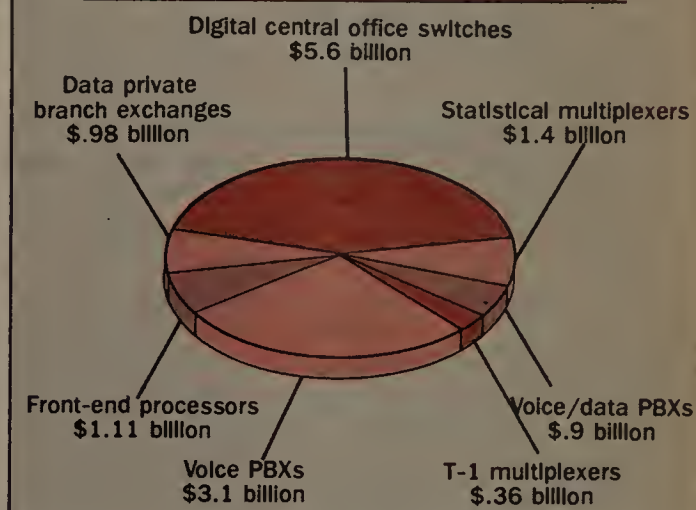
The network replaces point-to-point leased lines previously used to link branch offices around the U.S. to channel banks at Maxicare headquarters here. Those channel banks limited the company's ability to use cost-cutting voice compression and were unable to correct

See page 20

“Vendors looking to demonstrate their commitment to private, multivendor networks have to back up their marketing strategies with deliverable goods. Even though network management may not be a strong revenue source, it is a necessary evil.

“Technological Trends in Network Systems”  
International Data Corp.  
Framingham, Mass.

### 1987 backbone equipment market



SOURCE: FROST & SULLIVAN, INC., NEW YORK

## DATA DIALOGUE

JEFFREY HELD

## Shared resources make VSATs viable net option

By permitting expensive resources to be shared, very small aperture terminal satellite networks can minimize network costs and, in some cases, provide savings over terrestrial data network options.

A typical VSAT network consists of a master earth station, a satellite and small earth stations placed at remote sites. Equipment capabilities and cost are the fundamental differences between the master station and the smaller VSAT stations.

VSAT earth stations are inexpensive, typically priced between \$8,000 and \$15,000. They consist of two components: a dish antenna three to six feet in diameter and hardware needed to receive and transmit data.

While inexpensive, VSATs must be used in conjunction with centralized, sophisticated master earth stations costing \$2 million or more. Large networks can defray these expenses by distributing the costs among thousands of users.

But it is also important to understand that low-cost VSATs do not produce a sufficiently powerful signal to communicate directly with other VSAT stations. Only large (usually 30-ft) master earth station antennas have the required

sensitivity to communicate with VSATs.

Thus, a system requiring transmission between field sites is not a good candidate for a VSAT network. Most current data networks, however, use a centralized host with terminals communicating to and from that host. This suits the VSAT approach perfectly.

VSAT vendors have targeted two market niches. The first is as a replacement for multipoint data circuits. VSATs can reduce transmission costs, provide price stability and, possibly, provide better performance than multidrop data lines. Linking branch offices to a central site is the second niche.

The devices can consolidate data traffic for branch office devices such as data terminals, electronic cash registers, point-of-sale terminals and personal computers. Two retailing giants, Southland Corp. and K Mart Corp., recently chose VSATs for their large nets.

### Technical issues

VSATs operate on two frequency bands assigned by the Federal Communications Commission. The C band, which ranges from roughly 4 to 6 GHz, is most commonly used by commercial satellites. The Ku band covers 12 to 14 GHz and is not widely used.

The relative merits of the two bands have been the topic

See page 20

Held is group manager at Network Strategies, Inc., a Fairfax, Va., consulting firm.

## ► APPLE-TO-IBM CONNECTIVITY

## Simware unveils Mac-to-mainframe product

BY PAUL KORZENIOWSKI  
Senior Editor

OTTAWA — Simware, Inc. recently unveiled products that enable Apple Computer, Inc. Macintoshes to exchange data with IBM mainframes.

Simware, based here, announced Mac3270, which provides full-screen IBM 3270 terminal emulation and enables users to perform simple cut-and-paste operations to transfer screens of data to a host.

The program can be used with Sim3278 — protocol-conversion software for IBM hosts — to transfer files with IBM mainframes running under CICS or TSO.

Mac3270 can also be used to transfer files from one Macintosh to a second, or from a Macintosh to an IBM Personal Computer. Mac3270 provides Digital Equipment Corp. VT 100 and Teletek, Inc. terminal emulation.

Mac3270's Script language consists of more than 150 commands for automating tasks. Users can write a routine to log on to a system, extract data from a spreadsheet and upload it to an IBM host.

Mac3270 costs \$250 and prices for Sim3278 start at \$9,000. Motorola, Inc. and Chevron Corp. are said to have completed successful beta tests of Mac3270, which will be available in February. □

## ► NCR COMTEN

## SNA-link software out

BY PAUL KORZENIOWSKI  
Senior Editor

ST. PAUL, Minn. — NCR Comten, Inc. last week announced a new software release for its front-end processors that will enable customers to use an IBM gateway to link individual Systems Network Architecture networks.

The new release, ACF/NCP 4.1, supports IBM's Systems Network Interconnection (SNI) option, a gateway between SNA networks introduced by IBM in November 1983. The gateway enables SNA networks to be connected without changing their addressing schemes.

The NCR Comten software works in conjunction with IBM's

VTAM to route information over SNA networks. NCR Comten customers can use the SNI option or Comten Network Gateway, which provides SNI-like functionality but was developed by NCR.

ACF/NCP 4.1 also supports forced link deactivation, so a network operator can deactivate a link and its resources. Previously, the only way to deactivate a link was to take most of the network down. The software supports asynchronous communications at speeds of up to 19.2K bit/sec.

The new software will be shipped to beta sites in the first quarter. An initial software licensing fee runs from no cost to \$2,016, and monthly licensing charges range from \$56 to \$672. □



## Maxicare cuts costs

continued from page 19

data transmission errors, meaning that entire files often had to be retransmitted, according to Cliff Hollingworth, network manager at Maxicare.

Maxicare depends on its network to compete in the HMO business, which markets health plans to employers who want to offer health insurance to their employees. Network traffic, split 65% voice and 35% data, concerns hospital patients, their accounts and information about billing and contracts.

Each of the new network's 18 regional hubs is the site of a Timeplex Link/1, a multiplexer supporting data links ranging from low-speed digital data services to a maximum of six 1.54M bit/sec T-1 circuits. Current bandwidth demand requires only nine of the hubs to be linked with T-1 circuits. The other nine hubs communicate via leased 56K bit/sec digital

data service circuits. For example, the Link/1 at the New York City hub is connected with individual 56K bit/sec digital data service circuits to Chicago and to Indianapolis. The Link/1s in those cities are connected with a T-1 circuit and tied to the data center here with other T-1 facilities.

Each of the 18 hubs supports smaller local sites with analog leased lines running at 9.6K bit/sec. Those sites consolidate network traffic using statistical multiplexers from Timeplex — the Series III Microplexers — and the DCA 120 and 375 from Digital Communications Associates, Inc. The statistical multiplexers double as terminal controllers. The tail circuit modems used at either end of the lines are made by Timeplex and Fujitsu America, Inc.

For voice communications, the Link/1 supports Continuously Variable

Slope Delta (CVSD) modulation, a voice-sampling technique that compresses the bandwidth required for one conversation to 24K bit/sec. Use of CVSD enables up to 64 voice channels to be supported on a single T-1 circuit, compared with 24 voice channels per T-1 using industry standard pulse code modulation.

Maxicare is using the Link/1's CVSD capability to slash bandwidth requirements. Many companies have ignored this option because CVSD is commonly believed to have sound quality that is too poor for commercial use. Maxicare, however, has found the quality of CVSD circuits to be near toll quality, according to Hollingworth.

To interface with a private branch exchange, each of two QVM boards fits over four 25-pin RS-232 connectors on the Link/1's backplane. Each board outputs to a 50-pin amphenol connector, a standard voice connection. A standard telephone cable comes out

to a punch-down block, where individual wire pairs are broken out, said Mark Noe, network supervisor at Maxicare. Most of Maxicare's PBXs are NEC America, Inc. NEAC Model 2400s and Solid State Jr. Execs, but the company also uses Rolm Corp. switches and Northern Telecom, Inc. SL-1 switches.

The company maintains two data processing centers, so about 85% of network traffic is terminal to host. Hubs located west of Nashville are supported by the main data center here, which houses four Digital Equipment Corp. 11/780s, 20 DEC VAX 8650s and six DEC MicroVAXes. Hubs located east of Nashville are supported by the Nashville data center, a smaller site containing four DEC VAX 8650s.

A T-1 link allows the Nashville data center to keep the Los Angeles data center updated, and, as a result, about 15% of the network traffic is host to host. Some other host-to-

host traffic exists between three Link/1 Los Angeles-based hub sites, connected by microwave T-1 links.

Terminals in the network include DEC VT-220 terminals and C. Itoh & Co. (America), Inc. Model CIT 224 terminals, which are VT-220 emulators.

Adding new nodes to the network is easy, Hollingworth said, because the Link/1 has a nonblocking architecture. When a new node is added, he defines the route at the local and remote sites and connects the channel. The Link/1s update their own routing tables, he said.

Automatic rerouting and predefined priority tables handle downed circuits, Hollingworth said. "If one of the T-1 circuits goes down, the Link/1s will automatically reroute to their next path. The channels are layered for connect priorities so that we can connect certain priorities first and then connect some others as bandwidth becomes available." □

## Shared resources

continued from page 19

of considerable controversy.

One key measure of satellite network performance is link availability, or the percentage of time the satellite and an earth station are able to support data transmission.

The primary causes of link failures are atmospheric and weather conditions. Link availability has been at the core of the cy-

cle of claims and counter-claims advanced by makers of C- and Ku-band equipment.

The C band offers one advantage: It is not affected by inclement weather. However, C-band networks are susceptible to interference from other satellites and from terrestrial microwave transmission systems. Thus, they require more complicated licensing procedures.

Ku-band systems are more sensitive to weather, but they offer two advantages. First, the higher frequency allows the use of smaller antennas, and the relatively uncluttered state of the Ku band minimizes interference and simplifies licensing procedures.

Signal fading due to rain was an early problem for Ku-band satellite data networks. But, in recent years, more powerful Ku-band satellites and better electronics have made rain fade less important.

Customers can now design C- or Ku-band VSAT networks with link availabilities of 99.9%, or less than four hours of outage per year. This is considerably better than typical leased circuits, meaning link availability is essentially a nonissue.

Another concern is propagation delay. Since communications satellites hover in a geosynchronous orbit 22,300 miles above

the equator, it takes time for data to travel from the master earth station to the satellite and back down to the VSAT terminal. This delay, which is typically around 250 milliseconds, can result in serious performance problems for synchronous protocols if corrective measures are not taken.

Fortunately, corrective measures can be easily implemented. The primary technique is called pseudo-polling. In this technique, both the master earth station and the VSAT terminal generate or answer polls independently, thus simulating the host or terminal.

When a frame arrives with actual application data, it is forwarded through the network and transmitted to the receiving end on the next poll cycle. Thus, neither the host nor the terminal is aware that there is an intervening satellite link. This technique was originally developed for use on public data networks and has proven to be quite effective.

Pseudo-polling, however, does make VSAT stations protocol-sensitive, and users whose equipment requires unusual protocols may have some difficulty finding a VSAT vendor that supports their requirements.

Using pseudo-polling techniques, users can design VSAT networks with response times of two to three seconds. If response times of less than two sec-

onds are required, VSATs may not be the technology for the job.

Siting and licensing are other issues that worry potential VSAT users, but the procedures are actually quite straightforward.

C-band systems must go through FCC licensing procedures and site surveys to avoid interfering with existing microwave and satellite communications systems. The licensing procedure is largely administrative, and it is frequently handled by the vendor. This process typically takes three months, provided no special problems are encountered. One C-band vendor estimated that it has problems with less than 5% of its sites.

Ku-band systems are not subject to formal licensing procedures due to the low potential for interference. Thus, the lead time for Ku-band installation is shorter than for C-band systems.

Actual installation of VSAT terminals is relatively easy. Because of their small size and weight, VSATs can be installed using standard building materials. The primary requirements are a clear view of the satellite, reliable power and appropriate security measures. Installation requires approximately a half day and is provided by most VSAT vendors.

In the past few years, a new generation of VSATs emerged. These devices provide two-way communication and can be used on

interactive data communications networks. Vendors active in this marketplace include Equatorial, M/A-Com, Inc., GTE Spacenet Corp., AT&T, NEC Corp. and several other firms.

The announcement of two-way VSAT stations triggered high and as-yet-unfulfilled hopes for rapid market growth. Large users are reluctant to make major investments in unproven technology.

The problem is exacerbated by the small, relatively unknown firms that are the dominant players in the VSAT market. Finally, large customers already have sizable capital investments in existing equipment, software and staff. In many cases, they are not able to make major changes.

Consequently, the VSAT marketplace is undergoing consolidation, and smaller firms are being acquired.

It is unlikely, however, that the technology will achieve the growth rates originally forecast, and it may never become a dominant form of transmission. Assuming no major changes in tariff trends, VSAT technology will slowly gain acceptance, especially now that major players such as AT&T and GTE have entered the market.

VSATs do offer a technologically and economically attractive alternative to more conventional transmission facilities and merit consideration by any large user. □



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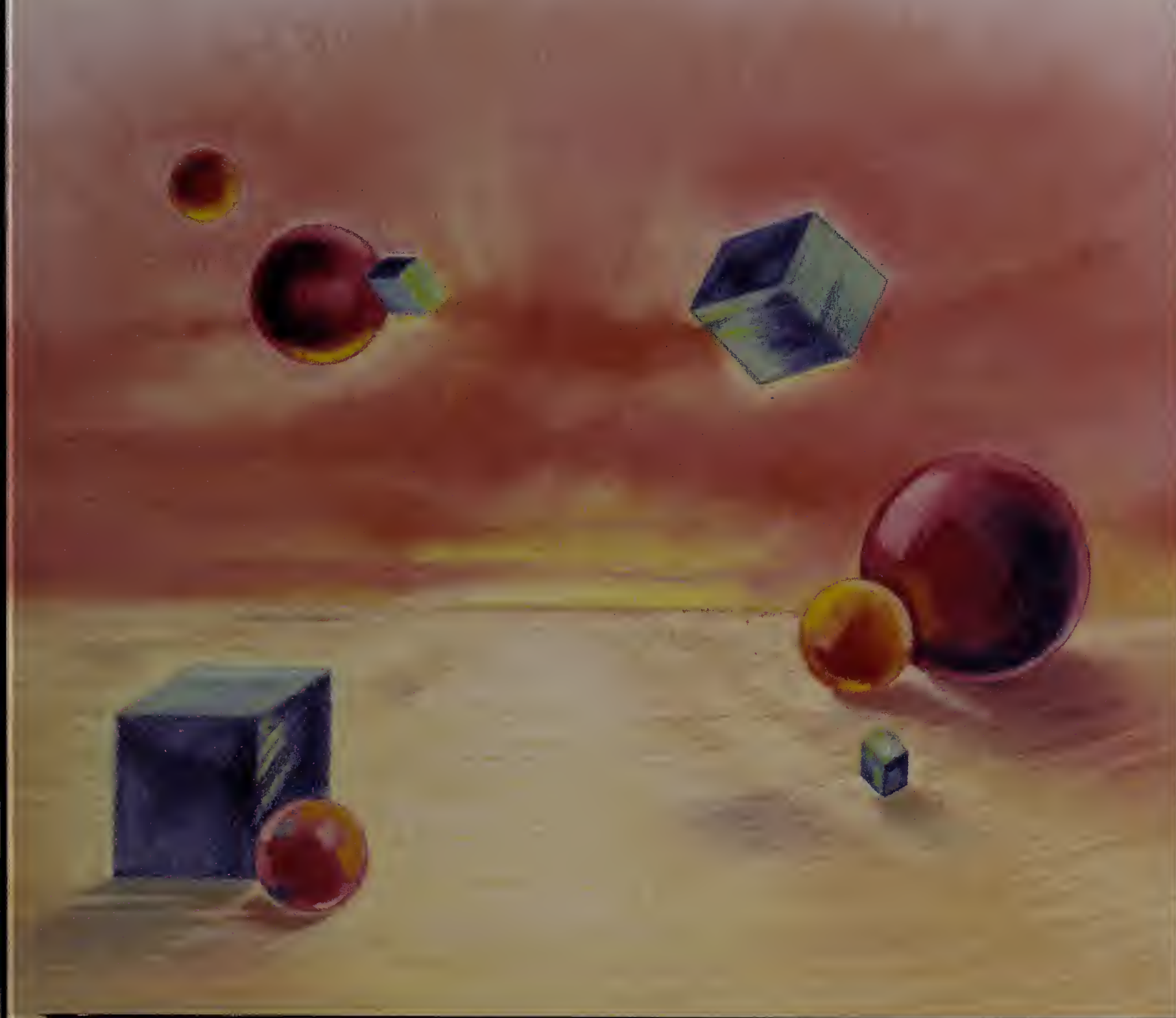


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THE INTEGRATED COMMUNICATIONS SHOW



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the show and the coveted Interface Prize will be given for extraordinary contribution to the communications industry. Don't miss this gala evening of dinner, dancing and entertainment!

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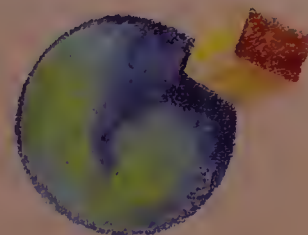
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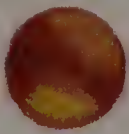
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### Forum On Open Network Architecture

Open Network Architecture (ONA) is heralded as "the" emerging standard for data and voice communications. But elements of the standard are vague and standards committees tend to spend more time on the political issues than technical issues. These sessions feature presentations by many of the best known sources who will share their insights on ONA, on how SNA fits in, and on CONAP's tightrope walk between the tariff-conscious BOCs and the wary FCC.

- ON-1 ONA Plans and Promises (Plenary)
- ON-2 CONAP Users Challenge Vendors and Regulators (plenary)
- ON-3 SNA to OSI: The Unfolding Strategies
- ON-4 SNA: A Connectivity Bridge for the Industry

### Connectivity For Interapplicability

There are so many alternative systems and devices today that it seems almost impossible to truly link them into a net. But there are many viable and cost-effective strategies for linking disparate systems. These sessions address the issues of connecting heterogeneous systems as well as tackling the issue of true interoperability. Networks in the '90s will have to involve heterogeneous systems, so these sessions are of vital importance to communications managers.

- CI-1 New IBM PC-to-Mainframe Strategies
- CI-2 VAX Based Connectivity Solutions
- CI-3 Apple's Business Connections
- CI-4 Other Proven and Popular Connectivity Approaches

### Network Planning And Management

Today's networks impact an increasing number of people and critical tasks within the organization, so down time and poor decisions have a disproportionately negative effect. In other words, it's tough to win and you just can't afford to lose. These sessions address issues facing the network manager, such as interoperability, centralized network controllers, tools for testing and optimizing the network and the role of the network manager as a manager.

- NP-1 Designing & Optimizing Interoperable Networks (workshop)
- NP-2 Network Management Policies and Procedures
- NP-3 NetView and Other Comprehensive Control Systems
- NP-4 Optimizers, Testers and Debuggers: An Update

### LANs: The State Of The Union

LAN managers and implementors are awash with a flood of confusing product information and rapidly changing standards. These sessions provide a comprehensive workshop on some of the tougher issues facing LAN managers, such as

making architectural decisions, which operating systems provide the best mix of features and how to integrate to ensure maximum productivity. These sessions provide exhaustive material for the exhausted LAN manager.

- LA-1 LAN Architectures: Who's in the Driver's Seat (workshop)
- LA-2 Operating Systems Only a LAN Could Love
- LA-3 Balancing File Server and Workstation Power
- LA-4 LAN Designers' Workshop on Integration
- LA-5 College of Cabling Knowledge (workshop)

### Widely Distributed Network Developments

The challenge: To provide real connectivity and interapplicability over wide areas. In addition to internal connections, the WAN implementor has to understand metro and local traffic nets as well as a wide variety of switching options and interarchitectural network protocols. Look to these sessions for solid solutions.

- WA-1 Making Large Scale Heterogeneous Networks Interoperable
- WA-2 Megachannel Networking on T-1,-2,-3, etc.
- WA-3 Rising Expectations for All-Digital Services
- WA-4 ISDN Test Site Revelations
- WA-5 New SAT-VSAT-CBX Vehicles for Bypassing Local Traffic and Tariffs

### Footprints Around The Globe

Just how far away is global connectivity and what will it mean to us? These sessions address the issues surrounding cost-effective global communications, such as X.25 protocols, ISDN and some of the existing global communications services. Participants in the Foreign Buyer Program are invited to attend these sessions at no charge.

- GA-1 Designing Global Nets with X.25 in Mind
- GA-2 ISDN: A Global Reality?
- GA-3 Cost/Benefit Tradeoffs in New Global Communications Services

### Global Communications Update

Can multinational companies implement international connectivity? Communications managers must contend with control issues, different protocols, international telephony, and the impact of divergent deregulations around the globe. Look to these sessions for answers and solutions. Participants in the Foreign Buyer Program are invited to attend these sessions at no charge.

- GC-1 Computer & Communications Integration: The Global Impact
- GC-2 The Future of Competition in International Telecom
- GC-3 Communications Deregulation: Will Worldwide Reform Answer User Needs?
- GC-4 Identifying and Handling Control Issues in Multinational Nets

# THE INTEGRATED COMMUNICATIONS SHOW



## Communications Planning And Management

Communications managers face a Herculean mandate in the '90s: To design and implement integrated networks which maximize the productivity of capital and human resources. Learn about the most important aspects of that mandate from staffing issues and balancing security vs. access to migration strategies and capital investment projections.

- CP-1 Strategic Application of Communications Resources
- CP-2 Finding Win-Win Strategies for the Security vs. Access Game
- CP-3 Staffing to Stay Afloat
- CP-4 Projection of Capital Investment in Communications Products for 1988/1989

## Telecommunications Horizons

Communications managers (and voice communications managers in particular) need to find ways to rein in the high cost of communications services. Discover strategies for increasing the capability of on-site switching and access equipment, enhancing the net with an eye towards cost-consciousness and call management systems. In addition, these sessions provide important perspectives on some of the newer telephony challenges on the horizon, such as FAXs, voice messaging and cellular communications.

- TH-1 More On-Site Power for Switching and Access
- TH-2 Software-Defined Virtual Network Enhancements
- TH-3 Your Future in Facsimile: From System to Board-Level Advances
- TH-4 Mobile Communications Concepts for the '90s
- TH-5 Call Management Systems to Curb Abuse and Costs
- TH-6 Voice Messaging: Powerful, Adaptable, & Here Today

## Electronic Communications

This series will provide managers with an update and overview on technology advances and strategies for the communication of words and pictures in today's environments. These

issues include updates on X.400 teleconferencing and image communications techniques.

- EC-1 X.400 and Other Improvements in Message Communications
- EC-2 Migrating to X.400 Advantages
- EC-3 Image Communications from Scanner to DTP to Video
- EC-4 Meeting the Technology Challenge of Integrated Teleconferencing
- EC-5 Hi-Res Graphics Communications Workshop

## Hardware And Software Highlights

The year's hottest technology trends are represented in these sessions covering everything from fiber optics and T1 strategies to TCP/IP and OS/2 + SQL implementation. There are important sessions to update you on advances in workstations and workstation software; conversion, concentration and contention devices; and peripherals for tomorrow's networks.

- HS-1 Network PC Workstation and Software Update
- HS-2 New and Neat Conversion, Concentration and Contention Devices
- HS-3 Fiber Optic Solutions for Backbone Nets
- HS-4 Tools to Maximize T1 Throughput
- HS-5 TCP/IP: An Interarchitectural Solution that Works
- HS-6 Power and Peripherals Required of Future Workstations
- HS-7 Exploring OS/2, SQL and the New Environment for Distributed Data Bases

## The Datacomm School

Providing basic and intermediate tutorials and updates for computer and communications professionals is an Interface Show tradition. Some of the finest minds in the field of data communications combine their efforts to update the less experienced professional in a series of comprehensive introductions to telephony and data communications.

- DS-1 Exploring the Voice Communications Network
- DS-2 Data Links and Nets: Principles and Practices
- DS-3 ISDN: An Introduction to the All-Digital Approach
- DS-4 Fundamentals of T1 Networking
- DS-5 Packet Switching Basics
- DS-6 SNA: Enhancements for a New Era
- DS-7 DECNET: Digital's Communications Framework



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# CONFERENCE SCHEDULE BY DAYS

## MONDAY, MARCH 28, 1988

10:00-11:00		KEYNOTE: The Connectivity Crisis: a Global Roadmap for Progress
1:30-3:00	CP-1	Strategic Applications of Communications Resources
	WA-1	Making Large-Scale Heterogeneous Nets Interoperable
	EC-1	X.400 and Other Improvements in Message Communications
	LA-1	LAN Architectures: Who's In The Driver's Seat
	HS-1	Network PC Workstation and Software Update
	DS-2	Data Links and Nets: Principles and Practices
	DS-1	Exploring the Voice Communications Network
3:15-4:45	CI-1	New IBM PC to Mainframe Strategies
	DS-3	ISDN: An Introduction to the All-Digital Approach
	NP-1	Designing and Optimizing Interoperable Networks
	LA-2	Operating Systems Only a LAN Could Love
	EC-2	Migrating to X.400 Advantages
	HS-2	New and Neat Conversion, Concentration and Contention Devices
	TH-1	More CPE Power for Switching and Access

## TUESDAY, MARCH 29, 1988

8:00-9:00	ON-3	SNA to OSI: The Unfolding Strategies
9:30-11:00	GC-1	Computer and Communications Integration: The Global Impact
	CP-2	Finding Win-Win Strategies for the Security vs. Access Game
	TH-2	Software-Defined Virtual Network Enhancements
	HS-3	Fiber Optic Solutions for Backbone Nets
	CI-2	VAX-Based Connectivity Solutions
	DS-5	Packet Switching Basics
	TH-3	Your Future in Facsimile from System to Board-Level Advances
11:30-1:00	ON-1	ONA Plans and Promises
1:30-3:00	DS-4	Fundamentals of T1 Networking
	DS-6	SNA-Enhancements for a New Era
	GA-1	Designing Global Nets with X.25 in Mind
	GC-2	The Future of Competition in International Telecom
	LA-3	Balancing File Server and Workstation Power
	TH-4	Mobile Communications Concepts for the 90's
	EC-3	Image Communications from Scanner to DTP to Video
3:15-4:45	DS-7	DECNET: Digital's Communications Framework
	GA-2	ISDN: A Global Reality?
	NP-2	Network Management Policies and Procedures
	CI-3	Apple's Business Connections
	WA-2	Megachannel Networking on T-1,-2,-3, etc.
	TH-5	Call Management Systems to Curb Abuse and Costs
	EC-4	Meeting the Technology Challenge in Integrated Teleconfering

## WEDNESDAY, MARCH 30, 1988

8:00-9:00	ON-4	SNA: A Connectivity Bridge for the Industry
9:30-11:00	WA-3	Rising Expectations for All-Digital Services
	GA-3	Cost/Benefit Tradeoffs in New Global Communications Services
	LA-4	LAN Designer's Workshop on Integration
	HS-4	Tools to Maximize T1 Throughput
	CP-4	Projection of Capital Investment in Communications Products for 1988/1989
	HS-5	TCP/IP: An Interarchitectural Solution that Works
	NP-4	Optimizers, Testers and Debuggers: An Update
11:30-1:00	ON-2	CONAP Users Challenge Vendors and Regulators
1:30-3:00	LA-5	College of Cabling Knowledge
	GC-4	Identifying and Handling Control Issues in Multinational Nets
	WA-5	New SAT-VSAT-CBX Vehicles for Bypassing Local Traffic and Tariffs
	NP-3	Netview and Other Comprehensive Control Systems
	HS-6	Power and Peripherals Required of Future Workstations
	EC-5	Hi-Res Graphics Communications Workshop
3:15-4:45	GC-3	Communications Deregulation: Will Worldwide Reforms Answer User Needs
	WA-4	ISDN Test Site Revelations
	CI-4	Other Proven and Popular Connectivity Approaches
	HS-7	Exploring OS/2, SQL and the New Environment for Distributed Data Bases
	CP-3	Staffing to Stay Afloat
	TH-6	Voice Messaging: Powerful, Adaptable & Here Today

## KEYNOTE

### The Connectivity Crisis: A Global Roadmap For Progress

The role of communications is to facilitate and enhance the conduct of business and to positively impact the bottom line. This year's distinguished keynoter, a veteran executive and visionary, will address the issues of global communications in a worldwide economy, the increased reliance on data as a corporate asset, and the building blocks for computer-enhanced commerce in the twenty-first century.

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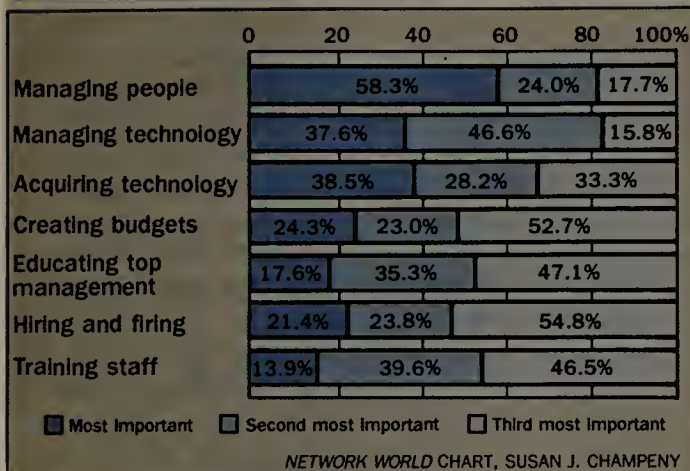
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# COMMUNICATIONS MANAGER

## Communications managers rate their most important activities



## FINANCIAL SERVICES

# Technical staff growth to stall

BY MICHAEL FAHEY  
Senior Writer

NEW YORK — Communications staffers will fare better than data processing personnel as financial service firms tighten their belts in the wake of the recent stock market crash, industry observers said. This is due, in part, to the financial industry's dependence on communications and on-line market information, analysts said.

However, technical staffers involved with planning and future communications projects will likely be affected by the market plunge, according to Don Gaffney, president of the Communications Managers Association.

"Companies will rely more on their day-to-day operational people," Gaffney said. "There will be a minimal number of people dedicated to planning and future projects."

Gaffney said that, while there will still be a call for qualified communications managers and support personnel, the expansion in technical staffs fueled by the five-year bull market has come to a halt.

"When things are looking good on Wall Street, there are no limits to budgets," said Gaffney, who is a vice-president at Fundamental Information Systems, a subsidiary of Williams Street Brokers in New York.

Roger O'Connor, staff consultant at Edward Perlin Associates, a New York-based personnel compensation management firm, agreed that caution is now the watchword when it comes to hiring technical staffers on Wall Street. A survey by Edward Perlin indicates that firms will take longer to replace outgoing staffers and will be more selective than in the past. It also found that a number of data processing managers will be instituting hiring freezes.

Technical staff turnover, which had been averaging around 18% to 21%, will decline in 1988, according to Edward Perlin's research.

Despite the slowdown, however, O'Connor predicted that opportunities will remain plentiful for communications personnel and data base software experts. "Those jobs are always quite difficult to fill, and the financial service industry is very dependent on its communication," he said. See page 22

## OPPORTUNITY KNOCKS

# MIS man jumps fence to join telecom team

Robert Paretchan sees future in telecommunications.

BY MICHAEL FAHEY  
Senior Writer

BLUE BELL, Pa. — After nearly 20 years as a management information systems professional, Robert Paretchan decided that the future lay in telecommunications.

In May 1987, Paretchan made the switch from manager of training and development in MIS at CertainTeed Corp. to manager of telecommunications.

"Telecommunications is a growing area, and it really offers interesting challenges," said Paretchan, who spent 12 years with IBM before working in data processing for two Pennsylvania banks. He joined CertainTeed, a manufacturer of building products, in 1984 as manager of end-user computing.

According to Paretchan, the lines between communications and DP are blurring, with the

two areas beginning to meld into one discipline. "First, there was explosive expansion in computing," he said. "Now the job is to tie all of those mainframes and minis and micros together."

Norm Oppenheim, president of Fortune Communications Group, a Nashua, N.H.-based personnel recruitment firm, said Paretchan is among a growing number of communications managers who have moved from MIS.

According to Oppenheim, communications may offer a fast track to the ranks of upper management. "You have more power and authority when you are responsible for all of your company's communications," he said.

Paretchan said he believes his background in MIS prepared him for the new multivendor environment that confronts telecommunications managers.

See page 22

## GUIDELINES

ERIC SCHMALL

# Technobabble as an art form

Communications managers fail if they fail to communicate. It's a foregone conclusion that written and verbal skills are essential to the successful application of communications management. Powerful ideas swaddled in technobabble have little chance of adoption within an organization.

But communications professionals need to develop a skill that goes beyond the application of accepted standards of rhetoric and composition. They must learn and adopt a linguistic style that reflects their organizations' cultural demands. They must augment that corporate language with equally powerful images borrowed from the communications industry. They also must learn to recognize the terms that are anathema to senior decision-makers and be sure to avoid them scrupulously.

Without too much trouble, a manager can become intimately familiar with celebrated corporate watchwords. These words can be found in every form of official correspondence from senior levels of the organization. The narrative portions of quarterly and annual reports, speeches, memos, reports and correspondence to employees contain sets of phrases that come into vogue and reflect a vision of what is currently considered important to the organization.

The repetition of these words and phrases sets an unspoken standard of language that communications managers

should feel free to exploit in their own writing and oral presentations.

Most of these words reflect some aspect of productivity, profitability, quality or success. Examples of these include words such as "efficiency," "effectiveness" or "synergy." In addition, the careful observer will see a new set of verbs from these sources. Management will speak of "growing the business" and express the desire to "ramp up" to opportunities. Despite the misgivings literate managers may have about using these terms, they should make an effort to weave some of them into the fabric of their reports and speech. The judicious use of these terms will only help managers to influence and persuade.

Aside from practical adaptation, managers are obliged to contribute to the pool of accepted phrases and concepts.

The telecommunications industry has spawned a number of potent ideas that managers should introduce into their organizations' lexicons. They should speak of the "competitive advantage" that technology has given to the organization. They should emphasize telecommunications as a "strategic weapon" and lecture on how it can be "leveraged" to corporate advantage.

As hackneyed as these phrases may seem to the trained professional — who is used to reading about these concepts in the trade press — they still need to be presented to others within the organization so they will be added eventually to the corporate lexicon.

See page 22

Schmall is network systems manager for an insurance holding company.



## MIS man joins telecom team

continued from page 21

"Now, there are multiple carriers and telecommunications vendors," Paretchan said. "This is new in telecommunications. But, in data processing, there have been multiple vendors and a broad array of equipment for a long time."

At CertainTeed, the telecommunications department is responsible for both voice and data communications. Paretchan currently reports to Jim Pitman, director of telecommunications, whom he hopes to succeed next year when Pitman retires.

"We have a varied environment," Paretchan explained. "We have point-to-point private lines, multidrop private lines and T-1 circuits. And microcomputer users can access our mainframe through a Rolm PBX."

The company has two Rolm 9000 CBX IIs at its Valley Forge, Pa., headquarters and one Rolm 9000 CBX II at the corporate data center located here. Two T-1 circuits connect the data center with headquarters 10 miles away. All but four of the 48 channels carry voice communications.

In addition, a voice-mail system from Octel Communications Corp. installed a year ago supports about 950 users at the company.

CertainTeed's private-line network connects the data center to manufacturing sites throughout the country. It includes two point-to-point lines operating at 19.2K bit/sec and four lines at 14.4K bit/sec. In addition, the network includes two multidrop lines, each supporting two sites, and a third supporting five sites. The multidrop lines operate at 9.6K bit/sec.

The network is an integral part

of CertainTeed's business operations, and it links manufacturing sites to the company's IBM 3083 mainframe. Billing, production scheduling and shipping information is passed between the manufacturing sites and divisional and corporate headquarters in Valley Forge on the network.

Despite the importance of the communications operation, only within the last year has Paretchan been able to convince upper management that communications planning should have the same status as MIS planning. Previously, communications reacted to the needs of the MIS department.

"We've had voice and data communications together for a number of years," said Paretchan, whose

background includes stints in hardware capacity and strategic planning.

"The next step is to work hand in hand with MIS in the planning

process so we can use all this technology to the best possible advantage," he added.

Paretchan is philosophical about upper management's relative slowness to involve the communications department as an equal partner with the MIS department in the planning process. In fact, he said, CertainTeed has seen the importance of communications in conducting its business earlier than many companies.

Users have long had extremely high expectations regarding the quality and reliability of voice communications, and now they are beginning to have the same expectations of data communications, Paretchan said.

"As communications becomes more important to companies' business plans," he said, "the expectation is that data communications, like dial tones, will be there when you need it." □

CertainTeed has seen the importance of communications in its business earlier than many companies.

## Technical staff growth to stall

continued from page 21

tions and data bases," O'Connor said.

Away from Wall Street, demand remains strong for qualified technical staff, with communications

personnel in particular demand, according to personnel experts. "Historically, there has been a big demand for technical staff, and that is continuing in the banking and finance industry," said Joseph DeGioia, president of the Maryland Association of Professional Recruitment Consultants. □

## ASSOCIATIONS

The Tele-Communications Association (TCA) has named Joanne Choi to handle public relations and to edit a new publication for TCA members. The publication is tentatively titled "New Connections" and will appear bimonthly.

"It will be produced using desktop publishing techniques and will cover issues of interest to our membership," said TCA President Jerry Appleby.

The newly formed Association of Telecommunications Professionals (ATP) is conducting a membership drive.

The group comprises telecommunications professionals from both user and vendor companies in Central Ohio. Voting membership is restricted to members from user companies. Each member company has one vote in ATP elections. While user companies can send as many members as they want, vendor companies are restricted to two members at ATP meetings.

"We are a user organization, but we welcome vendors," said Larry Learn, group secretary and director of telecommunications plan-

ning at On Line Computer Library Center in Dublin, Ohio. "They have a lot to offer us, and it is important that there is a forum for us to express our needs to them."

One of the main functions of the group is to provide a support network for telecommunications professionals, Learn said.

Telecommunications professionals are invited to submit seminar and tutorial topics for presentation at Network '90s, a telecommunications conference to be held Oct. 19 to 21 in San Francisco.

Topics for presentation should address switching, transmission or network development and may include basic research, hardware development and systems applications. An abstract of 200 to 500 words should be submitted for each proposed presentation by Feb. 15.

Abstracts should be sent to: Network '90s, Attention: Don Zuber, Pacific Bell, 2600 Camino Ramon, Room 1E200, San Ramon, Calif. 94583. For details on abstract formats, call Pacific Bell at (415) 867-6145. □

## Technobabble as an art form

continued from page 21

rate linguistic chain.

Before long, these phrases might be picked up by very senior members of the corporation. When they start bantering about terms that call for using telecommunications tools as part of their "arsenal," managers can recognize that they have not only contributed to the word stream but have subtly sold a concept.

However, there is a steep downside to attempting to master a corporate linguistic style. Some words and phrases represent "hot buttons" to key decision-makers. Their utterance brings about an emotional end to reasoned discussion.

Usually, these words are not likely to be simple nouns or common phrases.

No, the dreaded words are found more often to be proper names of vendors or product lines, a specific technology, an individual, a proj-

ect or similar in-house code names that are tied in the reader's or listener's mind with some disastrous past experience.

The manager who lets such a term slip soon learns a painful lesson. A perfectly researched report, a brilliantly assembled plan or an eloquently presented briefing can be reduced to ashes if the speaker carelessly makes one incendiary statement.

With just a little experience, reasonably astute managers will quickly determine what constitutes a major flashpoint word for different audiences. They will assiduously edit themselves so they can avoid the destructive effects of summoning up powerfully negative terms.

Communications managers' success in staying effective rests on their careful discrimination in choosing and using words and phrases to accomplish their goals. They must balance their judgment, learning the power of the evocative and refraining from the provocative. □

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# NEW PRODUCTS AND SERVICES

## ► CHANNEL SERVICE UNITS

### AT&T debuts CSU for Accunet T1.5

*Allows access to diagnostic data.*

BY JIM BROWN  
New Products Editor

BASKING RIDGE, N.J. — AT&T recently introduced a new channel service unit (CSU) for its Accunet T1.5 Service that enables users to access diagnostic information contained in the extended superframe T-1 data format.

Supplied in stand-alone and rack-mountable versions, the Extended Superframe Format (ESF) T-1 CSU converts D1D, D4 or other T-1 data formats to the ESF supported by Accunet T1.5 Service. Attached devices, including T-1 multiplexers and private branch exchanges, can be located as far away as 655 feet.

The ESF T-1 CSU includes front-panel LEDs that display signal, power and loop-back status. The ESF T-1 CSU will also collect the diagnostic information available with ESF. That information enables users to check for data errors in the T-1 data stream and measure network performance.

That collected information is accessed via an ESF Diagnostic Test Set, which was introduced along with the new CSUs. That test set links to the ESF T-1 CSU via a 310-

type plug jack, which is similar to the headphone jack used with stereo equipment. The test set also includes a front-panel keypad and an LED display screen.

Prompted by menu-driven software, users enter commands from the test set's keypad to retrieve the diagnostic information collected by the ESF T-1 CSU. That data can be displayed on LEDs. It can also be transferred from the test set via an RS-232 link to a printer or to an AT&T 6300 personal computer running AT&T's ESF Data Analysis Software.

Initial versions of the ESF Data Analysis software will support the transfer of data from the Diagnostic Test Set to the personal computer. A second version of the software will enable users to prepare customized reports with that data.

AT&T's ESF CSU Multiline System supports up to 28 ESF T-1 CSU cards in a single rack-mountable chassis.

This system also includes a network management controller capable of supporting up to 56 local or remote ESF T-1 CSUs.

The controller automatically polls remote ESF T-1 CSU cards to ascertain line status and to make

remote alarm and performance indicators available to a network operations center. In addition, it collects diagnostic information from each ESF T-1 CSU card in the chassis.

That data can be retrieved by the Diagnostic Test Set linked to the controller via a 310-type jack, or it can be transferred directly from the controller to a personal computer via RS-232. Switch settings on the controller can be used to select configuration options such as bit-error rate thresholds for each ESF T-1 CSU in the local chassis.

Those configuration options are also downline loaded to the remote ESF T-1 CSU that is paired with the local ESF T-1 CSU.

Stand-alone ESF T-1 CSUs cost \$3,800. The Diagnostic Test Set is \$8,050. The initial version of the ESF Data Analysis software is \$500, and the second version costs \$2,500.

A Multiline System chassis with controller is \$5,000. The T-1 CSU cards for the Multiline System are \$2,600 each. The products will be made available in the second quarter.

AT&T will also offer current users of its 551 T-1 CSU — a unit compatible with D4 framing — a \$2,100 kit to upgrade to ESF T-1 CSU functions. An AT&T spokeswoman said 551 T-1 CSUs that are not upgraded will remain compatible with Accunet T1.5 Service.

AT&T can be reached by writing to 295 N. Maple Ave., Basking Ridge, N.J. 07920, or by calling (800) 247-1212. □

## ► HIGH-SPEED LINKS

### Channel-to-channel units bow

BY PAUL KORZENIOWSKI  
Senior Editor

MINNEAPOLIS — Computer Network Technology Corp. (CNT) recently added two T-1-based channel-to-channel mainframe communications devices to its product line.

The products enable geographically dispersed IBM hosts to be linked via their block multiplexer ports using digital T-1 1.544M bit/sec transmission facilities. Without extenders, typical channel-to-channel links are limited to distances of a few hundred feet.

CNT's Channelink 5188 attaches to a maximum of eight IBM mainframes. The device, which mimics an IBM 3088 multisystem Channel Communications Unit, enables customers to access mainframe subsystems running under VTAM, such as IMS, CICS and TSO. A model of the 5188 that links two mainframes sells for \$27,000.

CNT's Channelink 5137 can be attached to one or two mainframes. It supports up to six links, each operating at 3M bit/sec over a full-duplex T-1 link.

Channelink 5137 supports up to 256 concurrent sessions between mainframes. Devices can be attached to the unit through RS-232, V.35 or RS-499 connections.

Both units feature 2M bytes of storage and can be expanded to support 10M bytes. In case of a line failure, the units will automatically reroute traffic over a spare T-1 line.

CNT offers network management software that runs on an IBM Personal Computer and enables customers to monitor the performance of T-1 facilities. A company spokesman said CNT is developing an implementation of NetView PC, which will link Channelink 5137 to IBM's NetView network management software.

CNT, a 4-year-old company, began shipping channel-to-channel units at the beginning of 1987. A company spokesman said CNT expected its year-end revenue to be \$2.2 million.

Bart Stuck, vice-president at Probe Research, Inc., a market research firm in Morristown, N.J., said a number of large companies are installing channel-to-channel units. The most common application is linking a backup data center to a central processor. □

## ► FACSIMILE

### Ricoh tool lets fax act as scanner

BY JIM BROWN  
New Products Editor

WEST CALDWELL, N.J. — Ricoh Corp. recently introduced software that enables its R2100 intelligent facsimile machines to act as image scanners and printers for IBM Personal Computers.

The new Imagenet and Imagemail software also helps reduce dial-up charges associated with frequent facsimile transmissions by enabling R2100s to be used in private, asynchronous data networks.

The R2100 can be incorporated into customer networks using RS-232 connections to statistical multiplexers or X.25 packet assembler/disassemblers. The R2100 can also be linked to Personal Computers via RS-232 seri-

al connections. Those connections operate at speeds from 300 to 19.2K bit/sec.

Imagenet enables images scanned by Ricoh's R2100 to be stored on Personal Computers as data files. Those same files can be printed later by an R2100.

Imagemail enables the microcomputer to direct transmission of documents to up to 250 remote facsimile or Personal Computer addresses on a distribution list.

Imagenet converts the Personal Computer file format to a facsimile file format before transmission. A single Personal Computer equipped with Imagenet can support any number of R2100s within a private network.

With Imagenet, a user at a remote R2100 can request a Person-

al Computer file using commands entered from the R2100 keypad. These commands are interpreted as ASCII characters by the microcomputer. Likewise, a Personal Computer user can direct a specific image file to be sent to any R2100 on the private network.

Imagenet will enable images scanned into the Personal Computer to be displayed on the Personal Computer monitor. Those images can also be merged with such graphics software packages as International Microsoftware, Inc.'s Dr. Halo and Z-Soft Corp.'s PC Paintbrush. Once merged, those images can be edited or merged with Personal Computer text files.

Imagenet will also work with a Ricoh Imagecard, a board that

See page 25



## First Look

### NSA introduces PC adapter board

**Network Software Associates, Inc. (NSA)** introduced an adapter board that lets IBM Personal Computers linked via coaxial cable to an IBM 3274 or 3174 terminal controller support multiple communications protocols.

**AdaptCoax** supports IBM's Distributed Function Terminal (DFT) feature on the 3274 or 3174 controllers. That DFT feature enables a Personal Computer-based communications adapter and communications software to exercise more control over the microcomputer-to-mainframe communications session. The new board will work in conjunction with NSA's Adapt3274 Information Display Station (IDS), Adapt3274 LU 6.2 and Adapt3274 Remote Job Entry (RJE) software.

Adapt3274 IDS enables a Personal Computer to support two IBM 3287 printer-emulation sessions as well as multiple IBM 3278 or 3279 terminal-emulation sessions with an IBM mainframe. Adapt3274 LU 6.2 enables a Personal Computer to support IBM's Advanced Program-to-Program Communications and provides an application interface to APPC programs running on the host, as well as to the suite of basic and mapped APPC programming verbs. Adapt3274 RJE enables the Personal Computer to emulate an IBM 3770 RJE workstation that supports bulk data transfers to the host. The software requires a Personal Computer with DOS 2.1 or above and at least 256K bytes of random-access memory.

AdaptCoax is priced at \$595, while the price of the software ranges from \$285 to \$785.

*Network Software Associates, Inc., 22982 Mill Creek, Laguna Hills, Calif. 92653, or call (714) 768-4013.*

### Newbridge expands MainStreet product line

**Newbridge Networks, Inc.** announced an ISDN-compatible network adapter and network management software for the company's line of products.

The **2601 MainStreet Data Termination Unit** enables a pair of terminals or IBM Personal Computers to link to Newbridge's T-1 multiplexer products located up to 1.9 miles away. The new product supports two RS-232 or V.24 data interfaces transmitting synchronous or asynchronous data at up to 64K bit/sec. The link uses echo-cancellation error-checking techniques.

The 2601 links to other major Newbridge products, including the 3600 MainStreet Bandwidth Manager and 3624 MainStreet Intelligent T1 Channel Bank, via a proprietary 2B+D link. The 2B+D specification is the Basic Rate Interface for Integrated Services Digital Network. The link carries two

full-duplex 64K bit/sec bearer channels and a 16K bit/sec signaling channel. Operational parameters can be downloaded to the 2601 from the host 3600 or 3624.

Newbridge also announced the **4601 MainStreet Network Manager**, a software package that runs on either an IBM Personal Computer AT or Personal System/2 with a color display. The pack can manage and control Newbridge's 3600 MainStreet Bandwidth Manager, 3624 MainStreet Intelligent T1 Channel Banks and the 2600 MainStreet series of ISDN data termination units.

The Personal Computer or Personal System/2 running the software is linked to the control port of any node in the Newbridge net-

work. The software enables the Personal Computer or Personal System/2 to communicate with all other nodes in the Newbridge network via an X.25-based control packet-switching system.

The 4601 software enables the network operator to configure all node-level and port-level parameters on each node in the network. The software will automatically save the routing tables and operations data bases contained on each Newbridge network node on a disk. The package also automatically monitors alarms and logs port-usage and error-rate statistics from each remote node.

The 2601 MainStreet Data Termination Unit is priced at \$400, while the 4601 MainStreet Net-

work Manager is priced at \$3,895.

*Newbridge Networks, Inc., 13873 Park Center Road, Suite 160, Herndon, Va. 22071, or call (703) 834-3600.*

### Board enables PCs to access AT&T's Switched 56

**DSP Technology Corp.** introduced a board that enables IBM Personal Computers to access AT&T's 56K bit/sec Accunet Switched 56 service.

DSP's **Speedlinx II** board supports full-duplex transmissions over four-wire lines. The board enables a Personal Computer to establish a dial-up 56K bit/sec connection with a similarly equipped

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will tell  
you about N.E.T.  
T1 networks:





Personal Computer. Users are able to link to AT&T central offices with Switched 56 capability via a leased four-wire line or a four-wire switched 56K bit/sec line from the local telephone operating company.

The new board complements the firm's existing Speedlinx 56 board, which enables Personal Computers to access AT&T's 56K bit/sec Data-phone Digital Service circuits.

With Speedlinx II, multiple Personal Computers can join a conference data call by dialing into an AT&T Alliance 3000 conference bridge via Accunet Switched 56 service.

The new board features an Intel Corp. 80188 microprocessor that enables it to process communica-

tions protocols. By executing customer-provided communications software on the new board, the Personal Computer can also establish a dial-up connection to an X.25 packet network.

When attached to a local-area network, the board also enables a Personal Computer to act as a gateway connecting other Personal Computers on the network to a mainframe. It will also act as a bridge between remote local-area networks linked via the Switched 56 service.

A single Speedlinx II board is priced at \$1,795 and will be available in March.

DSP Technology Corp., 1325 Capital Pkwy., Carrollton, Texas 75006, or call (214) 245-8831.

### Board links Macintosh IIs to IBM mainframes

Avatar Technologies, Inc. introduced an expansion card and software that lets Apple Computer, Inc. Macintosh II microcomputers emulate IBM 3278 and IBM 3279 terminals.

MacMainframe II enables a customer to connect a Macintosh II to an IBM mainframe via a coaxial cable. Users can transfer text, binary and document files between Macintosh microcomputers and IBM mainframes running CICS, TSO or CMS. File transfers require one of two host-based file-transfer programs, Avatar's Host File Transfer or IBM's Ind\$file.

MacMainframe II supports IBM

seven-color emulation, and users can select the colors with which they want to work.

Avatar also sells two other Macintosh-to-IBM mainframe products. The first is the MacMainframe SE board and software, which links a Macintosh SE to an IBM mainframe. The other enables Macintosh 512KE systems running MacMainframe DX software to link to an external unit that also attaches to an IBM mainframe.

MacMainframe II costs about \$1,000 and will be available in the second quarter. A single-site license for Avatar's Host File Transfer program is priced at \$500.

Avatar Technologies, Inc., 99 South St., Hopkinton, Mass. 01748, or call (617) 435-6872. □

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## Tool lets fax act as scanner

continued from page 23

enables Personal Computers to send and receive facsimiles. With the Imagecard, Imagenet commands can be used to instruct the Personal Computer to send facsimiles to any CCITT Group 3 or Group 2 facsimile machine via the public switched network. Imagecard was released along with the new software.

With Imagemail software, users are able to transmit documents up to 999 pages in length to each of 250 addresses on a distribution list. The Personal Computer determines whether the receiver is linked to the private network or the public switched network.

The product features an autodialing modem, automatic error checking and facsimile-status reporting.

The messages can be sent immediately or on a delayed basis. Furthermore, users can avoid excessive long-distance charges by sending a copy of the document via the private network to a remote R2100, which could then be instructed to dial other facsimiles located within local calling areas.

Ricoh's Imagecard includes a Personal Computer add-on board and software that enable the Personal Computer to send and receive facsimile documents while processing other applications.

Incoming facsimile messages are saved to disk. The product features an autodialing modem operating at 9.6K bit/sec, automatic error checking and facsimile-status reporting. It will redial busy facsimile numbers up to five times, at user-defined intervals. A message appearing on the Personal Computer screen alerts users when new facsimiles are received.

A package including both the Imagenet and Imagemail software will sell for \$395. The Imagecard board and software will cost \$1,175.

Ricoh is located at 5 Dedrick Place, West Caldwell, N.J. 07006, or call (201) 882-2000. □



# Opinions

The goal of a premiseswide Ethernet local-area network presents a major wiring dilemma, and coaxial cable is part of the problem.

## PRO:

**BY MICHAEL M. CLAIR**  
Special to Network World

Coaxial cable is more expensive than telephone wire. Furthermore, unlike telephone wire, it's not typically installed in every building, so users must incur the expense and inconvenience of adding it. They must also decide whether to run coaxial cable to every desk or just to current local net users and then rewire later for moves and adds. A better choice is to use existing telephone wiring, which already runs to every desk.

The bus topology typically used with Ethernet-over-coaxial cable is also an impediment to growth, because it provides no central point of connectivity and no central focal point for moves, additions or network troubleshooting. These problems don't exist when using existing non-shielded twisted-pair wiring, which is typically configured in a star topology.

Additionally, these new Ethernet products support 10M bit/sec transmission speeds over non-shielded twisted-pair D inside wire, which ranges from 24 to 26 gauge, with impedance in the 100 ohm range. Most existing twisted-pair wiring fits that description.

A simple check with a handheld time domain reflectometer (TDR) provides virtually all there is to know about telephone wire that's already installed. Other criteria for a successful application include the availability of two pairs at each desk and the lack of bridge taps, or multiple extensions of the same line. This may also be evaluated with a TDR.

The three technical hurdles to Ethernet-over-nonshielded twisted pair that have been overcome include attenuation, radio frequency emissions and protection from electromagnetic susceptibility.

Optimally, the Ethernet should provide at least 300 feet of reliable transmission between the desktop and the wiring center. The actual attenuation of D inside wire is 3dB/100 feet at 10M bit/sec. Telephone wire in virtually all buildings conforms to this specification, which is one of the objectives of the IEEE 10BaseT Study Group, currently meeting to establish standards for non-shielded twisted-pair Ethernet.

Secondly, the user must select a nonshielded twisted-pair Ethernet that is certified to satisfy

*Clair is vice-president of marketing for SynOptics Communications, Inc., an Ethernet local-area network vendor in Mountain View, Calif.*

Federal Communications Commission Part 15, Class A emissions requirements, while preserving the integrity of the Ethernet signals.

This has been achieved through the use of filters.

Finally, protection from electromagnetic susceptibility is accomplished by the use of differential receivers and drivers that reject interference on the non-shielded twisted-pair wire.

Integrated fault isolation and network management schemes available only on twisted-pair Ethernets help control the ongoing costs of running Ethernet local nets. Laborsaving devices available with star-topology Ethernets — such as diagnostic

See **Pro** next page

This past year was supposedly the year of Ethernet over nonshielded telephone wire. Indeed, products have been intro-

duced by SynOptics Communications, Inc., 3Com Corp., Digital Equipment Corp., Hewlett-Packard Co. and many others. Yet, during all the hoopla, not one analyst or consultant has challenged the practicality of these implementations.

Inhabitants of buildings that are stuffed to capacity with cabling are primary targets of vendor sales pitches. Isn't it appealing to use wire that's in the walls collecting dust?

Two myths have been spread to users. The first is that the customer can use existing telephone wire. The second is that it's

## CON:

**BY MIKHAIL ORLOV**  
Special to Network World

cheaper to install Ethernet over existing telephone wire than over coaxial cable.

Vendors attempt to cloud these real issues by discussing a

nonissue: topology. However, standards already exist for running Ethernet at 10M bit/sec over coaxial cable in a bus topology (10Base5), over nonshielded twisted pair at 1M bit/sec in a star topology (1Base5) and in a combination of these (10Base2, or thin-wire Ethernet). Therefore, the question is not one of topology but of whether it's practical to run 10M bit/sec Ethernet over nonshielded twisted pair.

Most existing twisted pairs have been designed exclusively to carry voice signals, and their parameters differ drastically from what's required for an Ethernet signal. Properties such as capacitance, impedance and velocity of propagation directly affect the quality of an Ethernet network. These properties differ not only between an Ethernet coaxial cable and a nonshielded twisted pair, but between numerous types of existing nonshielded twisted pairs in users' buildings. That is, the Ethernet signal would have to match a variety of specifications corresponding to a variety of different twisted pairs.

The velocity of propagation varies with the type of twisted pair and also with temperature. This change demands either an additional distance limitation for an Ethernet segment or different specifications of both a minimum Ethernet packet size and a maximum Ethernet packet size. Years ago, technicians didn't pay attention to this problem when they installed twisted pairs, nor did they think of running 10M bit/sec data over the telephone wire. However, a designer of new Ethernet must handle this problem.

Although it's technically feasible to modify an Ethernet signal to transmit over nonshielded twisted pair, it's currently unrealistic to try to do so cost-effectively.

Many manufacturers claim they've modified the Ethernet signal to make it suitable for use with nonshielded twisted pair, but each has accomplished this with proprietary technology. As a result, users may have an Ethernet packet suitable for one implementation but unsuitable for another. Multiple incompatible implementations of Ethernet are emerging.

Another problem with using existing telephone wire is that it

*Orlov is a network systems engineer at Boston University. He also teaches and consults on communications technologies and products.*

## Is it wise for users to run Ethernet over existing nonshielded twisted pair?

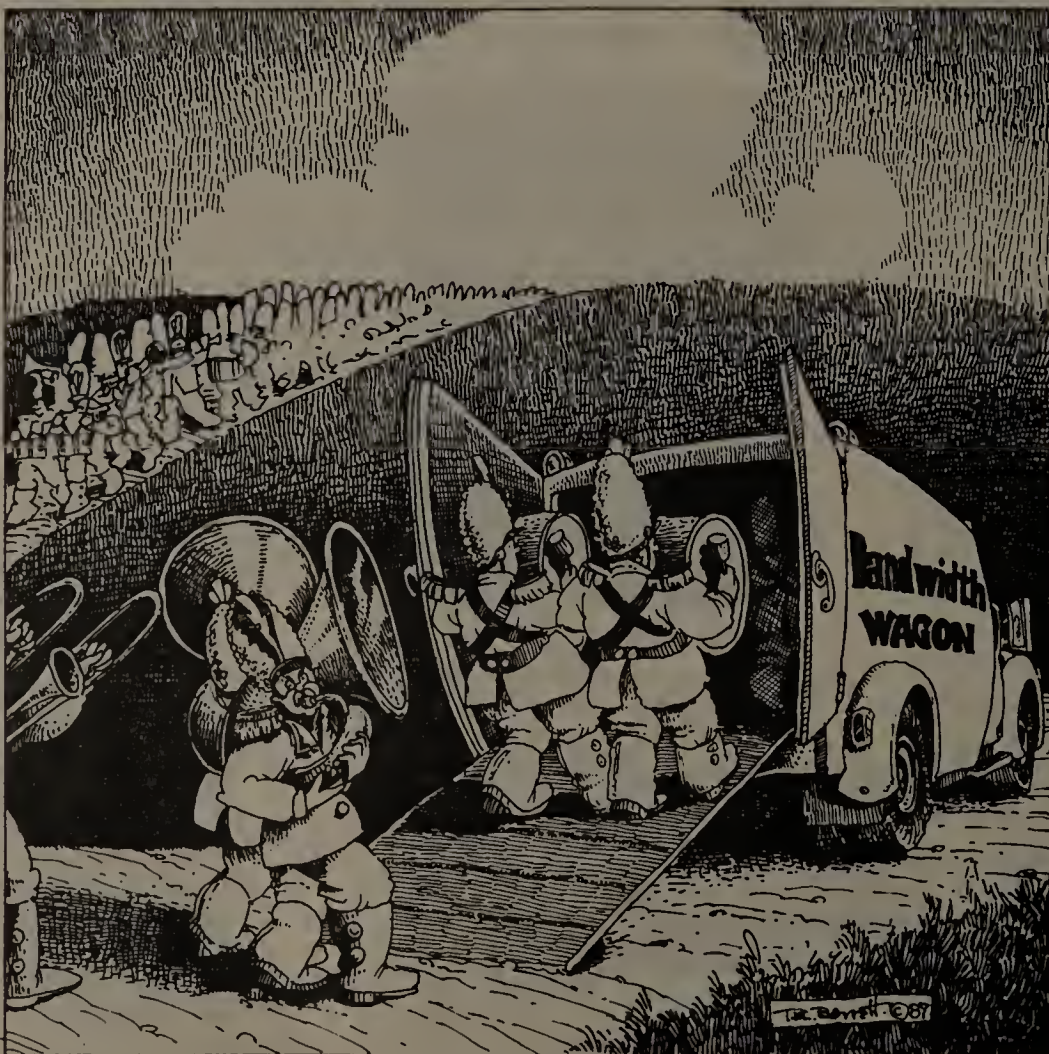


ILLUSTRATION ©1987 TOM BARRETT



# Opinions

## ► TELETOONS — By Phil Frank

*Ralph... a good telecommunications manager doesn't let up the minute he's reached his daily performance goal.*



may be old. While age doesn't affect Ethernet coaxial cable, it does affect the transmission capabilities of telephone wire. Moreover, twisted pairs don't deteriorate uniformly. After a decade in a building, twisted pairs in the same bundle may have different impedances, cross talks, velocities of propagation and so on. Telephone company technicians know that and don't use existing wire. But is any wire already installed usable? The only way to know is to test it.

However, when moving from coaxial Ethernet to 10M bit/sec non-shielded twisted-pair Ethernet, one is migrating from simple testing by a technician with a few hours' training to complex certification procedures that require several pieces of complex test equipment and the services of an experienced cadre of technicians. The user goes through all this just to find out that the bundle can't be used, that only certain pairs are usable or that the pairs can be used for voice traffic only.

Network planners who are considering a traffic mix such as telephone, 1,200 bit/sec to 19.2K bit/sec data, 56K bit/sec data and 10M

See **Con** page 47

**Pro** from previous page

LEDs that specify link status and fault status on an individual node and that can be viewed from the wiring center — simplify the troubleshooting process and speed up network restoration.

Wire center management via consolidated patch panels provides data technicians with the simplest, most expedient form of moves and additions since changes can be made reliably, quickly and with excellent record keeping at very low cost. This is similar to private branch exchange management.

The hidden cost of a local-area network that's malfunctioning or down for maintenance includes file losses and productivity losses by users whose applications are inaccessible during network downtime.

Nonshielded twisted-pair Ethernet networks, with their star topologies, can minimize these costs by containing faults to a single user on a point-to-point, twisted-pair link. They're four or five times more efficient than bus-type, coaxial-cable Ethernet networks in terms of mean time to repair — and that adds up to a lot of time and money saved.

See **Pro** page 47

## NETWORK WORLD EDITORIAL

# The effects of integration

In 1986, there were 11 million business telephones and two million computer workstations in use in the UK. By 1995, the ratio of phones to workstations there is predicted to be 1-to-1 — 12 million of each.

That phenomenal growth in workstations — similar to predictions for other countries — will occur only if computer technology continues to become easier to use and more functional.

The evolution of networks that support functionally integrated voice and data is central to both those goals.

Although voice/data integration is often regarded as vendor hype — a solution looking for a problem — eventually the technology will lead to fundamental changes in the way people access and use computers.

Integrated networks will evolve in two obvious ways, both driven by the need to make computers easier to use and more functional: Data will be added to existing voice networks, and vice versa.

Adding data to wide-area voice networks would enable callers to share screen-displayed information in real time. Callers could show *and* tell, a capability that would greatly increase worker productivity. As they say, a picture is worth a thousand words.

The reverse, adding voice support to existing data networks, could enable — among other things — users stymied by a data application to use their Help keys to establish a voice/data link to a help desk. That single connection would forward data regarding the user's quandary to an expert technician and let the technician verbally explain why the problem occurred.

An IBM official speaking at a recent seminar on Integrated Services Digital Networks said that adding such a "human safety net" to data networks would enable applications to be implemented much faster and less expensively than they are today.

According to IBM calculations, integrated networks capable of supporting this type of function would cut down on the time required to implement broadly used corporate applications. The company estimates that applications could be up and running in six months instead of 24 months, at 50% of the cost.

In addition to promising in-

creased acceptance of information processing technology, these two voice/data network integration scenarios will also spur fundamental changes in the way information is accessed.

The same IBM executive likens the evolution of integrated voice/data networks to that of the retail industry. Way back when, stores kept their inventories under lock and key and customers required the help of counter personnel.

Now customers are free to browse through store inventories at their leisure and usually interact with store personnel only at the checkout counter.

Today's information processing industry, the IBM executive argues, is where the retail industry was in its infancy. Information, for the most part, is kept in centralized warehouses and managed by a few guardians. To access corporate data, end users typically submit search requests that are processed by the keepers of the data base.

In the future, integrated voice/data networks will enable end users to browse through corporate data bases in the same way they shop for groceries or auto parts, calling in experts only when they get stuck or need additional help.

Although admittedly far in the future, such networks would help make the best use of computer resources by removing the MIS bottleneck. End users outfitted with the proper tools could access their own information, leaving corporate programmers to tackle only the big jobs.

This would help reduce application programming backlogs, which still take two years or longer at large firms. It would also ensure that employees are armed with the best available information to do their jobs, one of the key strategic aims of most Fortune 1,000 companies.

How do we get there from here?

Many vendors, including AT&T, IBM, Digital Equipment Corp. and other heavyweights, are already working to incorporate integrated voice/data functions into their product lines. Most of these products, however, provide only the functions within a building. The ability to extend integration functionality across public networks will come with the advent of ISDN. □



# The new IBM 9750 Business Communications System.



For everybody who wants more flexible computer networks, IBM has an answer: more flexible *telephone* networks. Even better, we've made them a reality.

Introducing the IBM 9750 Business Communications System and its centerpiece, the new IBM 9751 CBX.

Developed by ROLM, they give you powerful digital voice switching capability, plus data connectivity for virtually any desk that has a phone on it.

Unlike other telephone switches (or PBXs), the IBM 9751 CBX comes with nearly every line "data-ready." So when you hook up your phones, you get computer connectivity in the bargain.

That way, you no longer have to decide in advance exactly how every single workstation ought to be networked. You have the flexibility to connect occasional (or unexpected) users, easily and economically. With an IBM 9750 fully installed, you can open your data resources to more people who need them, without spending to equip areas that may never need them.

Even if you use it for voice only, the IBM 9751 CBX will keep you years ahead. It's one of the most expandable systems in the industry, able to serve from 100 to 20,000 lines. So as you



# Any connection between voice and data is purely intentional.



grow, it grows. Yet it's much smaller than its predecessor, the ROLM CBX II, and it's easier on power and air conditioning.

On the other hand, its traffic-carrying capacity is tremendous. The 9751 can be configured so it's virtually impossible to block.

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NETWORK WORLD

## Features

January 11, 1988

# Delmarva Power

► *T-1 SYSTEMS*

## Raised to a power of 16

Delmarva Power & Light chooses multiple T-1 links to replace DDS circuits.



corporate users in customer service and accounting departments would be located some 10 miles away from the company's new data processing facilities.

Additionally, Scoggin was given the task of reevaluating and upgrading the company's overall transmission network — including a 15-year-old analog microwave system. The network, which serves 2,500 employees scattered throughout Delaware and parts of Maryland and Virginia, supports virtually every facet of the utility's business, from meter reading and billing to computer-aided engineering and power distribution.

#### T-1 satisfaction

Scoggin's experience with T-1 dates back to 1984, when Delmarva installed its first T-1 circuit between the company's Northern Division General Office in Wilmington and its former corporate data center about 10 blocks away.

The wideband digital pipe, provided by Diamond State Telephone Co. of Wilmington, replaced 20 analog 9.6K bit/sec circuits and reduced Delmarva's monthly line costs for the two sites from \$3,500 to \$1,500.

It also eliminated the daily modem failure and analog line-impairment problems that Delmarva had been experiencing with the 9.6K bit/sec lines. Scoggin attributes the eradication of these problems to "the inherent higher reliability of T-1" and to the implementation of fully redundant T-1 multiplexers that replaced nonredundant modems.

"All in all, it was a very positive experience," Scoggin recalls. "We never experienced a failure in three years, and it ran absolutely clean. We never had an equipment problem; and, even though we stocked on-site spares, we never had to use them."

This positive experience prompted Scoggin to consider T-1 as a viable alternative to the dozens of analog tie lines and dedicated private lines that

linked the company's offices in Wilmington, Newark, Del., and Salisbury, Md.

This consideration was reinforced by a recommendation from a multidepartmental task force, which was formed in 1985. The task force suggested that a T-1 backbone network be implemented to replace Delmarva's aging analog microwave system.

Scoggin also decided that the least expensive way to support remote users left behind after the data center move was via channel-extension units linked over a T-1 circuit, rather than by 56K bit/sec circuits. "We made this decision primarily because we already owned all of the local 3274 controllers at the data center," Scoggin says. "If we had used 56K circuits, we would have had to replace those 3274s with remote units. That would have been expensive."

Ultimately, Scoggin and the task force came up with a T-1-based system that included a private, fiber-optic T-1 link between the new data center in Newark and Delmarva's Salisbury office.

The design included a mix of public and private T-1s to link other key locations. These T-1s also enabled the direct connection of the utility's Centrex operations and two Northern Telecom, Inc. SL-1 private branch exchanges to two of the local telephone company's central offices.

In all, the design involved seven T-1 nodes, seven T-1 lines on telephone company facilities, two 45M bit/sec private fiber-optic systems and a T-1 digital microwave system — for a total of 16 T-1 circuits.

Scoggin's plan raised a number of managerial issues. First, the idea had to be sold to upper management. Second, because the proposed network involved both public and private transmission facilities that crossed local access and transport area boundaries, Delmarva faced coordinating the efforts of two dif-

ferent Bell operating companies as well as AT&T.

Moreover, within Delmarva itself, several different departments would be involved in implementing and testing once equipment vendors had been selected and hardware was installed. Departments involved included distribution, systems operations, information systems (IS), transmission, construction management and real estate, plus an outside contractor.

#### Selling upper management

Delmarva may be unique in that Scoggin had few, if any, problems with securing both the funding and interdepartmental cooperation required to carry off the T-1 project.

"I was given a fixed budget for performing the relocation of the data center, and it was my responsibility to determine how to spend it and how to accomplish the cutover within budget," he says. "Basically, the message we got from management was to get the job done within that budget."

Neither Scoggin nor his manager, George Potts, Delmarva's manager of user services and telecommunications, was willing to discuss the cost of the T-1 project except to say that the project was within the budget. Potts, however, notes that the T-1 project was part of a package deal, one that went hand in hand with the data center relocation.

"If we had to do the T-1 project by itself, it might have been more difficult to gain management support," he says. Also, he notes that upgrading the utility's communications facilities dovetailed with the company's overall strategy of building for the future.

"When you look at a new building and you know you are going to be in it for 20 years, and you're in the power business, you know you are going to have certain requirements," he explains. "We're trying to put

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**BY JULIA KING**  
Special to Network World

Early last year, John Scoggin, supervisor of network operations and telecommunications for Delmarva Power & Light Co. of Wilmington, Del., was given a task that many telecommunications managers consider the ultimate nightmare — relocating the company's corporate data center.

Included in this challenge was the design and implementation of a communications network that would continue to provide cost-effective voice service as well as subsecond response times. One difficulty was that

*King is a free-lance writer based in the Philadelphia area.*





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off building new power plants for as long as we can, but once we start, it's going to be capital-intensive. So, right now — when we're not building power plants — is the time to get our facilities together. This [T-1 project] is just part of getting facilities in place for the future."

As for cooperation from other departments, Scoggin

explains that Delmarva, as a matter of policy, places a heavy emphasis on teamwork and encourages inter-departmental projects.

"There's a lot of pressure to cooperate as part of a team. If you're a continual stumbling block to getting the work done, senior management doesn't take it very well. They just don't tolerate it," he says.

Moreover, Scoggin notes

that there were none of the traditional turf battles that often take place between voice and data departments on such projects because the two departments had been combined under his supervision earlier.

"We didn't have the kinds of political problems other companies might have on a project like this because, essentially, we in the IS department were the

managers of a project team with representation from the several departments involved," he says.

It should be noted that project manager is only one of the hats Scoggin wears in his role as overall coordinator of Delmarva's communications system. He has also doubled as an inventor, having designed a mobile fiber-optic splicing lab complete with four-wheel

drive, heavy-duty winch and 5,000-watt portable power supply. In addition, Scoggin has served as a lineman, having scaled distribution towers to check fiber connections; a computer programmer; a systems analyst; a financial planner; a teacher and trainer; an overall troubleshooter; and a master of diplomacy.

#### The BOC connections

On the public side, Delmarva's T-1 network involves two telephone companies — Diamond State Telephone Co. of Delaware and Chesapeake and Potomac Telephone Co. of Maryland — as well as AT&T, which provides a T-1 link between corporate headquarters in Wilmington and Delmarva's Salisbury office.

While most communications managers might dread the prospect of coordinating BOC services, Scoggin awards high marks to both of the BOCs serving Delmarva, especially Diamond State Telephone, with which his company shares what he calls a utility mentality.

"The local [BOC] technicians and our technicians generally know each other and are on a first-name basis. It's not an adversarial relationship at all," he says.

#### Arming up

Once Delmarva had decided on T-1, the next step was to select suppliers of equipment, including multiplexers and a network management system. Scoggin and his team had decided that a software-based multiplexing system was most desirable, and they drew up a request for quotation of more than 100 pages.

"We decided on a software-intensive solution because we wanted the capability to reroute around failures dynamically without having to create tables of all alternate routes," Scoggin says. "It's also easier to upgrade with a software-based system."

The group studied responses from six equipment manufacturers: Spectrum Digital Corp. of Herndon, Va.; Timeplex, Inc. of Woodcliff Lake, N.J.; Infotron Systems Corp. of Cherry Hill, N.J.; Racal-Milgo, Inc. of Sunrise, Fla.; Network Equipment Technologies, Inc. of Redwood City, Calif.; and Digital Communications Associates, Inc. (DCA) of Norcross, Ga. This field of contenders was then nar-

Continued on page 36



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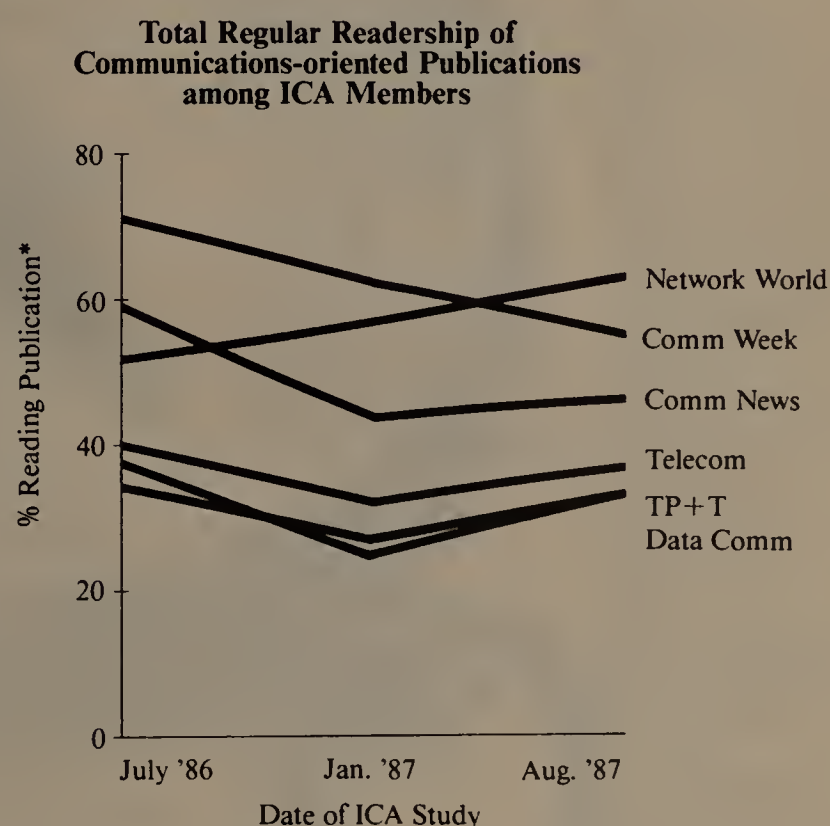
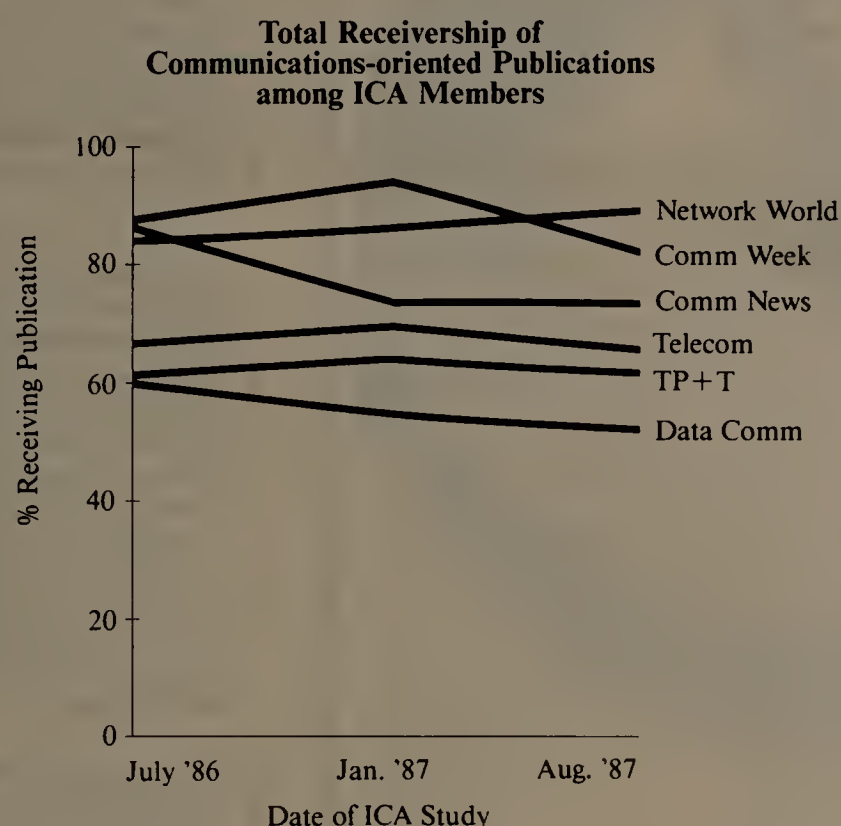
Gary J. Beach  
Publisher

"Rome wasn't built in a day." Although you've heard this saying time and time again, the philosophy behind it — that through hard work you can make things better day by day, week by week, and year by year — remains sound.

It's this very philosophy that *Network World* editors have followed during the past 18 months. And in doing so, they have remained true to their initial goal: to make each issue of *Network World* the best possible for you, our readers.

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As you can see in the following charts, both receivership and readership of *Network World* among ICA members have steadily increased since July 1986. However, during this time period, these same ratings have declined for almost every other communications-oriented publication.



\* Readership figure for each publication is based on the number of ICA members who receive that publication.  
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Cordially,

*Gary J. Beach*

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rowed to three.

"Three of the vendors were rejected within the first week," Scoggin recalls. "Generally, they were trying to sell vaporware or were overpriced."

To decide on a vendor, Scoggin and members of his network operations staff visited the plants of the three manufacturers where they "torture-tested" T-1 equipment.

After "doing things that some of the manufacturers have never seen done to a T-1 node," Scoggin selected DCA's System 9000.

"We simulated failures and repair work that might be done out of sequence by untrained individuals," he says. "If those individuals made a mistake, we wanted to

make sure that mistake wouldn't blow us out of the water."

Scoggin says his torture-testing brought the entire network "down to its knees" at one point, "but within about 15 minutes, we were able to bring it back up, initiating all of the recovery action right from the console, using DCA's Network Management System."

Other tests included powering nodes off while they were running and "ripping cards out of the machine, also while running, trying to mess systems up as best we could."

"There really was a method to our madness," he explains. "The point was to simulate failures of common control cards and loss of routes and clocking sources to see how the system responded."

Ultimately, Scoggin was so impressed with the DCA equipment that he modified his network design to include two additional T-1 nodes at Delmarva's Gas Division headquarters in Wilmington and at the company's Engineering and Production offices in Newark. These additional nodes, which were not in the company's original design, replaced multiple digital data service circuits at the two sites.

#### Cost-justification

"We were able to add these nodes and still come in within our original budget. Line costs of the replaced [digital data service] circuits outweighed the T-1 line costs," Scoggin says. He adds that,

in his experience, T-1 can be justified from a cost standpoint whenever it replaces more than three 9.6K bit/sec circuits that terminate in the same central office.

DCA's System 9000 Network Management System now monitors Delmarva's entire T-1 network, including lines that are furnished by the local telephone companies. Thus far, Scoggin says, there have been no disputes with the telephone companies when the DCA system indicates problems with BOC lines.

#### Disaster recovery

In fact, by using the DCA equipment, Scoggin was able to alert Diamond State Telephone of an internal channel bank failure at one of the telephone company's central offices.

Diamond State was alerted to the problem on a Saturday night after a scheduled power shutdown at Delmarva's corporate headquarters, where workers had shut down the T-1 node to complete some rewiring. Once the work was finished and the T-1 node reactivated, Scoggin discovered a yellow alarm on a T-1 circuit that links the node to the central office's Centrex system.

DCA's system of yellow alarms and red alarms is the same system used by AT&T and local telephone companies. A yellow alarm indicates that a particular problem is off-site, while a red alarm indicates a local problem, Scoggin explains.

"It just so happened that after the shutdown, we had a yellow alarm on our system that was totally unrelated to the shutdown," Scoggin recalls. "We had enough faith in our diagnostic equipment to know that it wasn't a multiplexer problem, so I called Diamond State and told them I suspected a channel bank failure."

"Within an hour and 10 minutes, a man had come in, solved the problem and had all the circuits back up. That's not bad for a Saturday night."

#### Expansion plans

Delmarva's fiber-optic link connecting its new data center and its Salisbury office was completed in December of 1987.

The network is expandable, having been designed to accommodate all anticipated voice and data requirements for a minimum of 15 years. This year alone, Scoggin says, he expects to increase the number of T-1 circuits from six to a dozen on the fiber-optic link connecting Delmarva's new data center and its Northern Division general office.

Delmarva also plans to add online computer-aided drafting applications, as well as all of its engineering records, to the T-1 system. Doing so will enable the utility to generate an integrated set of records that can be shared by various departments at different locations, Scoggin says.

"T-1 is the way to go, hands down," he says, "especially if you're in a data-intensive environment like ours." □

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BUYER'S  
GUIDE

## T-1 Multiplexers

# They're not the same old bit-pushers anymore

**Continued from page 1**

33% of T-1 system configurations in 1987, while networks and backbones were used in 34% and 33%, respectively. Vertical Systems forecasts that backbone applications will account for 52% of T-1 applications by 1990, and that point-to-point communications and networking will be used in 18% and 30%, respectively.

These application changes are reflected in user buying patterns. Many users are selecting T-1 network and backbone systems with "smart" switching and alternate-routing facilities. The same is true now of network management systems: Some T-1 customers are demanding systems that can control and diagnose networks that were impossible to build with equipment available only a few years ago.

Users also want better bandwidth utilization, especially for voice inputs. Thus, quantization techniques, such as Adaptive Differential Pulse Code Modulation (ADPCM), are being teamed with proprietary voice-compression schemes, such as Digital Speech Interpolation (DSI), to squeeze four voice channels or more into a single 64K bit/sec DS0 channel.

Even the way T-1 multiplexers handle voice and data is being challenged by fast packet-switching technology. Proponents of the latter feel it can outstrip the

former, especially when it comes to alternate routing.

## Something for everyone

The current crop of T-1 multiplexers has something for everyone. For basic no-frills applications, channel-bank-like multiplexers are available. For more voice and data handling, a group of multiplexers is being marketed that will accommodate hundreds of channels.

For the "leading edgers," there are about a dozen products that sport networking capabilities and claim to provide dynamic routing. The latter is the promised deliverance for those weary of writing network maps and entering them into multiplexer-resident routing tables. With a true dynamic system, users just enter the end points and the system does everything else. While just about every vendor contacted claims to have dynamic routing, some consultants feel that's a bit of an exaggeration.

As sophisticated as the products have become, everything is not utopian in T-1 land. Users and vendors still complain about the overall quality of T-1 carrier services, citing frequent outages, high bit-error rates and phase jitter among the most prominent problems. And users point out that a good deal of work remains to be done to provide network management systems that can handle off-net applications such as AT&T's Dataphone Digital Service and tail circuits.

One of the biggest gripes heard among those interviewed is that current network management systems are too limited, requiring separate systems for different applications.

"What users really want is a simple network manager that can handle multi-vendor products," says Jeff Held, a consultant with Network Strategies, Inc. in Fairfax, Va. That's a tall order, but several vendors are now working to create such systems.

AT&T's Unified Network Management System and Timeplex, Inc.'s Time/View are such products. But most are still just specifications — although products with some base functions such as alarm monitoring and reporting are available now. Of course, IBM has Net-View/PC.

There are two basic requirements for the implementation of a system that manages multivendor environments. The first is for the vendor of the management system to get other vendors to furnish interfaces. The second is for the vendor to convince users that it has the expertise to pull it off.

AT&T and Timeplex are publishing their interface specifications and inviting vendors to start writing, but don't look for a stampede. Many multiplexer manufacturers may be reluctant to align themselves with other multiplexer vendors' network management systems, and besides, some might view open systems as open season on their customer base.

Many vendors may opt to stay on the sidelines until the International Standards Organization (ISO) releases its network management recommendations. Currently, the Common Management Information Services and Protocol is under review by the ISO.

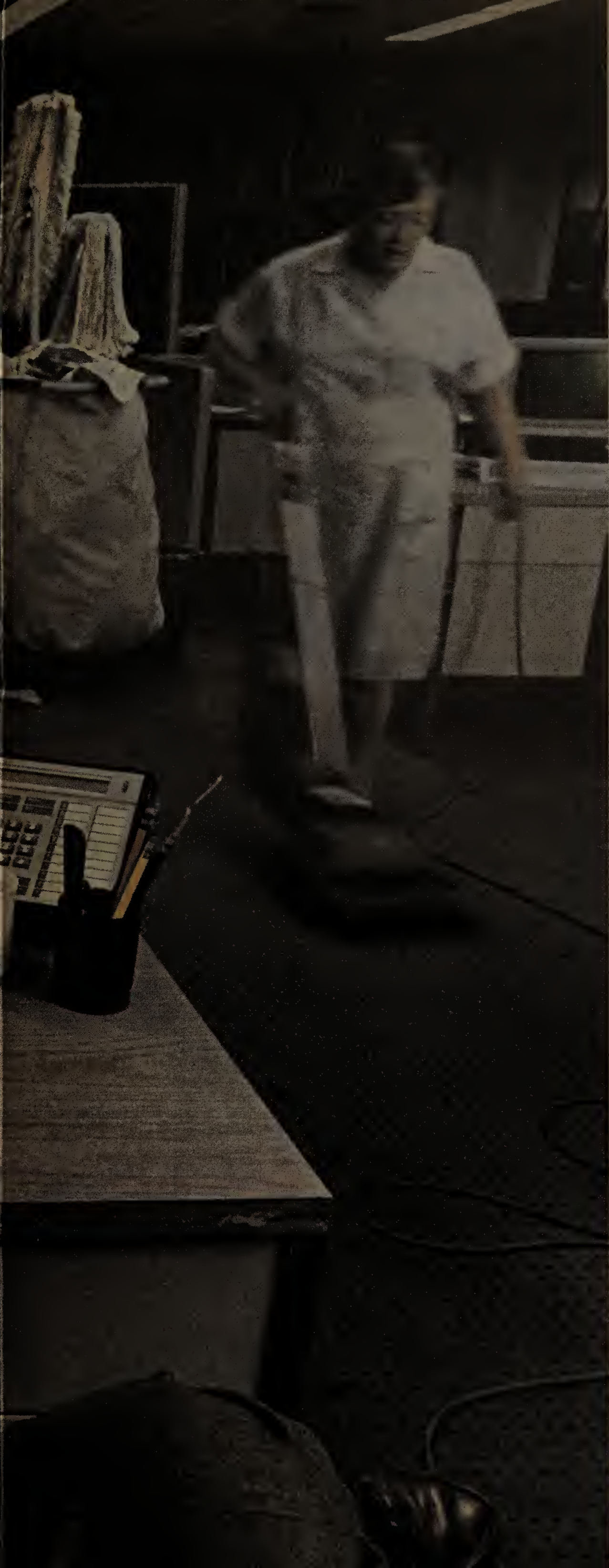
Selling users on a vendor-sponsored  
Continued on page 43

*Hunter is president of TMS Corp., a telecommunications consulting firm in Devon, Pa.*









**“It's 6:33 pm. The lines are down. And she's the closest thing I've got to a technician.**

*Meanwhile, I've got a sales guy here waiting to close a half-million-dollar deal, and he's screaming 'why didn't my order go through.' I have no clue. My technical staff is home watching the game. And all I keep thinking is whatever happened to that word reliability? If I could have anticipated the problem, at least I would have had a chance. As far as I'm concerned, somebody at headquarters better start talking to AT&T about getting a network management system. Or they can find themselves a new whipping boy.*

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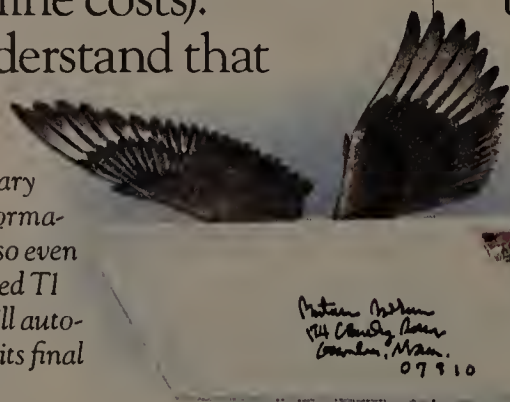
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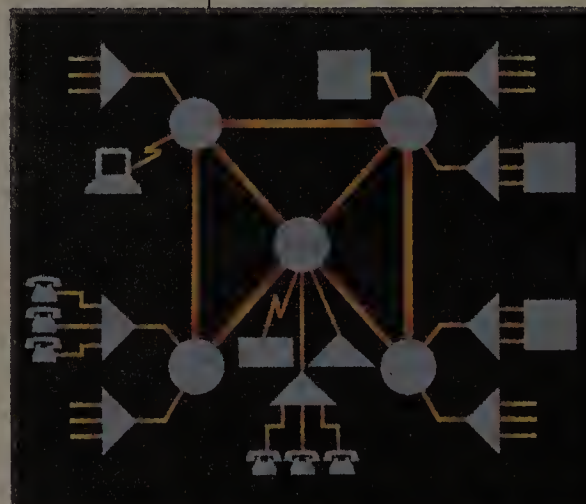
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From page 39  
network management scheme is another tough job. "The fact is, none of the major multiplexer vendors has demonstrated that they have the products or experience to manage large voice and data networks," says Tim Zerbic, vice-president of technology for Vertical Systems.

"AT&T has no track record in data, and Timeplex has none in voice. I don't see any vendor dominating," he says.

#### User-controlled DACS

Tellabs, Inc.'s soon-to-be-announced Telemark network manager is an ambitious undertaking of a different kind. It will permit users of Tellabs' T-Carrier Crossconnect systems and multiplexers to control Digital Access and Cross-Connect System (DACS) switches, instead of having the service provider do everything, as is the case now.

Rick Calder, Tellabs' program manager for network management products, says Telemark will reside on a Digital Equipment Corp. MicroVAX II. According to Calder, the net manager will allow users to configure and control their entire network end-to-end with no involvement of carrier personnel. That's significant since the lack of direct user control is one of the big complaints users have about DACS.

Mark LaRow, a consultant with Network Strategies, says he doubts the carriers will allow very much control since large networks are involved and since the carriers employ DACS to transmit network control information.

Tellabs' Calder says otherwise. "We've been talking to the RBHCs and other common carriers, and they're very interested. They figure that if customers have more control, they will be less likely to bypass."

The domain of user control, according to Calder, will be restricted, however. The DACS subscriber will establish virtual private networks, and passwords will govern what can be done. "A certain class of user will be able to monitor, while others will be allowed to reconfigure their [virtual private] networks," he says.

#### Fast switching

Users are demanding multiplexers that provide rapid switching on primary and alternate links. Dynamic rerouting around a failed T-1 link is very important since time-sensitive applications such as those using IBM's Systems Network Architecture cannot maintain a session during a lengthy manual reconfiguration.

Such applications must also be assured bandwidth on the alternate link if traffic should become congested. Most vendors handle that by assigning channel priorities, with higher channels getting preference. The only products in this survey that don't support such priorities are Amdahl Corp.'s MultiStar III and BBN Communications Corp.'s T-500 CSU.

Sophisticated rerouting may be

the icing on the cake to some users, but it's the cake itself to others. That's certainly the case with Sungard Recovery Services, located in Wayne, Pa. Sungard's principal business is to assure that data processing centers maintain data communications if a disaster such as a flood or fire should knock out the primary communications facility.

"We have about 500 subscribers all over the country, and we must be able to provide complete rerouting [of communications] should one or more disasters occur," says Jim Domainico, director of network products for Sungard. The company interfaces with T-1 multiplexers at customer locations and links them to Infotron Systems Corp. NX4600s located in Philadelphia,

Chicago and San Diego.

"We need at least a 4,000-port switching capability plus the ability to control the customer's configuration from a remote site. The 4600 gives us that," he says.

The need for fast alternate routing prompted a large financial services company to choose Network Equipment Technologies, Inc. IDNX multiplexers. One user, who asked that his name and company affiliation not be revealed, says the IDNX's fast rerouting capability was the determining factor in the selection. The network consists of a ring configuration with IDNX 40s and 70s. "We're running 22 channels, and all are SNA; we have to reroute in less than 30 seconds or lose sessions. The IDNX was the

fastest we looked at," the user says.

#### Fast packet switching

While many people agree that fast switching is important, some think the bit-mapping techniques used by most T-1 multiplexers are not the way to do it. The trade press has been running stories about fast packet technology, proclaiming it to be more efficient.

One of the most frequently referenced T-1 multiplexers using fast packet technology is StrataCom, Inc.'s IPX. (Codex Corp. acts as an OEM for the IPX and markets it as its Model 6290.) The IPX's packet consists of an entire 193-bit T-1 message frame, and frames are

Continued on page 47

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T-1 multiplexers

Vendor	Model	Application	Routing technique	Maximum input channels	Maximum synchronous input channel rate (bit/sec)	Maximum T-1 links	T-1 link speed (bit/sec)	Framing	DACS compatibility	Voice quantization and speed (bit/sec)	Redundant logic and power	Lowest price/average price
Amdahl Corp. Richardson, Texas	MultiStar III	P-P and network	Dynamic	92	768K	2	1.544M	D4, ESF	DS1, DS0	ADPCM: 32K; CVSD: 64K, 48K, 32K, 24K and 16K	Logic standard; power optional	\$9K/\$25.6K
	MultiStar IV	P-P and network	Dynamic	1,380	768K	15	1.544M	D4	DS1, DS0	ADPCM: 32K; CVSD: 64K, 48K, 32K, 24K and 16K	Logic standard; power optional	\$33K/\$65K
AT&T Neptune, N.J.	Acculink 740 T-Mux	P-P	Table	128	1.536M	1	1,200 to 1.131M	Table	DS1, DS0	PCM: 64K; ADPCM: 32K and 24K	Optional	\$9K/\$18.5K
	745 T-1	Network	Dynamic	Varies	1.544M	16	1.544M	D4, ESF	DS1	ADPCM: 32K	Standard	\$12K/\$23K
Avanti Communications Corp. Newport, R.I.	ONX	Network	Dynamic	480	1.5M	16	56K to 2.048M	D4, ESF	DS0	PCM: 64K; ADPCM: 32K	Optional	NA/\$150K
	Ultramux	Network	Table	96	1.5M	6	48K to 2.048M	D4	DS0	ADPCM: 32K	Optional	NA/35K
Aydin Computer Systems Horsham, Pa.	6248-20	P-P	Table	128	768K	1	128K to 1.544M	D4	DS1, DS0	PCM: 64K; proprietary: 16K	Optional	\$10K/34K
	6296	P-P	Table	120	768K	1	1.544M	D4	DS1	PCM: 64K; proprietary: 16K	Optional	\$25K/\$65K
BBN Communications Corp. Cambridge, Mass.	T-500 CSU	Network	Dynamic	160	768K	15	56K to 1.544M	D4, ESF	DS1	PCM: 64K; ADPCM: 32K	Optional	60K/NA
Coastcom Concord, Calif.	D/I Mux-II	P-P	Table	24	1.536M	1	1.544M	D4	DS1, DS0	PCM: 64K	NA	\$4K/\$12K
Codex Corp. Canton, Mass.	6290	P-P and network	Dynamic	100	1.344M	32	1.544M	D4, ESF	DS1, DS0	ADPCM: 32K; proprietary: 16K	Optional	NA/NA
Datatel, Inc. Cherry Hill, N.J.	DCP 9100	P-P	Table	96	1.536M	1	1.544M	D4, ESF	DS1, DS0	PCM: 64K; ADPCM: 32K and 24K	Optional	\$4.8K/\$30K
	DCP 9900	P-P and network	Dynamic	1,728	1.536M	18	56K, 64K, 1.544M and 2.048M	D4, ESF	DS1, DS0	PCM: 64K; ADPCM: 32K and 24K	Standard	\$25K/\$100K
Digital Communications Associates, Inc. Alpharetta, Ga.	9000 Series	Network	Dynamic	144	1.536M	36	1.544M	D4	DS1	PCM: 64K; ADPCM: 32K (needs external transcoder)	Optional	\$40K/NA
	Netlink System 7000	P-P	Table	128	2.048M	1	Up to 1.544M	D4	DS1	CVSD: 9.6K to 64K	Logic optional, power standard	\$6.2K/\$11K
Dynatech Communications, Inc. East Greenwich, R.I.	Intelink D/I	P-P	Dynamic	55	1.536M	2	1.544M or 2.048M	D4, ESF	DS1, DS0	ADPCM: 32K; proprietary: 32K	Optional	\$2.7K/\$16K
Emulex Corp. Costa Mesa, Calif.	CS-41	P-P	Table	144	9.6K asynchronous*	1	1.544M	D4	Not applicable	Not applicable	Not applicable	\$2.6K/\$3.2K
General DataComm Industries, Inc. Middlebury, Conn.	MegaMux Plus	P-P	Table	54	1.152M	1	4.8K to 2.048M	Proprietary	DS1	PCM: 64K; ADPCM: 32K, 24K and 16K; CVSD: 14.4K to 64K; proprietary: 8K and 16K	Optional	\$12.5K/\$25K
	MegaSwitch	P-P and network	Dynamic	512	1.152M	24	4.8K to 2.048M	D4, ESF	DS1, DS0	PCM: 64K; ADPCM: 32K, 24K and 16K; CVSD: 14.4K to 64K; proprietary: 8K and 16K	Optional	\$20K/\$50K
Granger Associates Santa Clara, Calif.	CP 2000 Enhanced	Network	Table	130	1.536M	20	1.544M	D4, ESF	DS1, DS0	PCM: 64K; ADPCM: 32K	Optional	\$8K/\$18K
Hubble, Inc. Pulsecom Division Herndon, Va.	PD4-24	P-P	Table	24	64K	1	1.544M	D4, ESF	DS1, DS0	PCM: 64K	NA	\$1.5K/NA
Infotron Systems Corp. Cherry Hill, N.J.	NX4600	P-P and network	Dynamic	4,000	1.024M	96	4.8K to 2.048M	D4, ESF	DS1, DS0	PCM: 64K; ADPCM: 32K and 21.3K	Optional	\$18K/\$75K
	InfoStream 1500	P-P and network	Dynamic	128	1.024M	2	1.544M or 2.048M	D4, ESF	DS1, DS0	ADPCM: 32K	Optional	\$4.5K/\$15K
Network Equipment Technologies, Inc. Redwood City, Calif.	IDNX 20	P-P and network	Dynamic	228	1.344M	8	56K to 1.544M	D4, ESF	DS1, DS0	PCM: 64K; ADPCM: 32K and 24K; proprietary: 16K	Optional	\$26K/\$35K
	IDNX 70	P-P and network	Dynamic	768	1.344M	96	56K to 1.544M	D4, ESF	DS1, DS0	PCM: 64K; ADPCM: 32K and 24K; proprietary: 16K	Optional	\$41K/\$200K
Newbridge Networks, Inc. Herndon, Va.	3600 Mainstreet Bandwidth Manager	Network	Dynamic	1,152	1.92M	16	2.4K to 2.048M	D4, ESF	DS1, DS0	PCM: 64K; ADPCM: 32K; proprietary: 32K and 16K	Optional	9K/40K
Paradyne Corp. Largo, Fla.	Model 3230	P-P and network	Dynamic	508	2.048M	8	48K to 2.048M	D4, ESF	DS1, DS0	PCM: 64K; ADPCM: 32K and 24K	Optional	\$22K/\$65K
Racal-Milgo, Inc. Sunrise, Fla.	Omnimux 9000	Network	Dynamic	144	1.536M	36	1.544M	D4	DS1	PCM: 64K; ADPCM: 32K (needs external transcoder)	Optional	\$40K/\$80K
Scittec Corp. Newport, R.I.	Maxima	Network	Dynamic	512	2.048M	16	200 to 2.048M	D4, ESF	DS1	ADPCM: 64K, 32K and 24K	Optional	\$20K/\$45K
Spectrum Digital Corp. Herndon, Va.	ISDX	P-P and network	Dynamic	508	2.048M	8	4.8K to 2.048M	D4, ESF	DS1, DS0	PCM: 64K; ADPCM: 32K and 24K	Optional	\$20K/\$75K

ADPCM = Adaptive Differential Pulse Code Modulation  
CVSD = Continuously Variable Slope Delta Modulation  
DACS = Digital Access and Cross-Connect System  
ESF = Extended Superframe Format  
NA = Information not available

LPVS = Link Packet Voice Server  
P-P = Point-to-point  
PCM = Pulse Code Modulation  
\* No synchronous data-handling capability

Chart continued on page 47



The CP2000  
Intelligent T1 Multiplexer  
Announces

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Features	Linked Intelligence Monitor	Linked Intelligence Controller	Linked Intelligence Control Center
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Automatic Route Restoration	Operator-directed	Operator-directed	Automatic Optimum Route Restoral
Best Route Optimization	Operator-selected	Operator-selected	Automatic
Dial Back-up	Yes	Yes	Yes
Automatic Alarm Reporting	Yes/Netview P.C. Support*	Yes/Netview P.C. Support*	Yes/Netview P.C. Support*
Reports/Alarms	Pre-defined	User-defined	User-defined
Diagnostics	Command-oriented; — local — remote	Menu-driven; — local — remote — system	Menu-driven; — local — remote — system — circuit
Levels of Security	5	User-definable	User-definable
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Network Synchronization	Pre-programmed	Pre-programmed	Dynamic

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T-1 multiplexers (continued)

Vendor	Model	Application	Routing technique	Maximum input channels	Maximum synchronous input channel rate (bit/sec)	Maximum T-1 links	T-1 link speed (bit/sec)	Framing	DACS compatibility	Voice quantization and speed (bit/sec)	Redundant logic and power	Lowest price/average price
StrataCom, Inc. Campbell, Calif.	IPX	Network	Dynamic	600	1.344M	96	1.544M	D4, ESF	DS1	ADPCM: 32K; proprietary: 16K	Optional	\$25K/\$50K
Tau-tron, Inc. Westford, Mass.	Intraplex TDM 155	P-P	Table	168	1.536M	1	1.544M	D4, ESF	DS1, DS0	PCM: 64K; CVSD 64K and 32K	Not offered	\$5K/\$12K
Tollabs, Inc. Lisle, Ill.	53X T-Carrier Cross-connect	P-P and network	Table	256	64K	256	1.544M or 2.048M	D4, ESF	DS1, DS0	PCM: 64K	Optional	\$9K/\$17K
	Cross-connect	P-P and network	Table	128	1.536M	16	1.544M	D4, ESF	DS1, DS0	PCM: 64K; ADPCM: 32K and 24K	Optional	NA/NA
Timeplex, Inc. Woodcliff Lake, N.J.	Link/100	P-P and network	Dynamic	15,000	1.152M	144	4.8K to 2.048M	D4, ESF	DS1, DS0	PCM: 64K; ADPCM: 32K; CVSD: 64K, 32K and 16K; proprietary: LPVS, 6.4K	Optional	\$31K/\$90K
	Link/2	P-P and network	Dynamic	208	1.152M	6	4.8K to 2.048M	D4, ESF	DS1, DS0	PCM: 64K; ADPCM: 32K; CVSD: 64K, 32K and 16K; proprietary: LPVS, 6.4K	Optional	\$10K/\$35K

ADPCM = Adaptive Differential Pulse Code Modulation  
CVSD = Continuously Variable Slope Delta Modulation  
DACS = Digital Access and Cross-Connect System  
ESF = Extended Superframe Format  
NA = Information not available

LPVS = Link Packet Voice Server  
P-P = Point-to-point  
PCM = Pulse Code Modulation  
\* No synchronous data-handling capability

SOURCE: TMS CORP., DEVON, PA.

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dynamically assigned to users on an as-needed basis. With conventional bit/byte interleaved multiplexers, users share message frames.

According to David Owen, director of product marketing for StrataCom, each packet carries a unique address and is transmitted using the bus-based switching architecture of the IPX. "The users establish virtual circuits, and all packets slated for the same address travel over them," he says.

The IPX, according to Owen, handles alternate routing more efficiently since entire packets are switched, as opposed to rerouting data a bit at a time. "We can reroute a link in 700 msec to two seconds," he says.

Owen also says the IPX is more efficient since packets are assigned on an as-requested basis and no packet is sent unless it's filled. While that may be fine for voice or

high-speed data inputs, what about low-speed data? Won't there be delays in filling packets?

"We don't feel that many applications will be in the 9.6K [bit/sec] and below range," Owen says, "but if they are, we'll delay the packet no more than 20 msec. If necessary, we'll send partially filled packets."

**Ultimate solution?**

Vertical Systems' Zerbic says he doesn't believe packet switching is the ultimate solution to T-1 efficiency. "You don't need packets to get good data bandwidth utilization. The current [T-1 multiplexers] do that."

Zerbic says fast packets would provide better voice bandwidth utilization, especially if DSI is used. DSI fills the silent portions in a conversation with other voice inputs (for example, when one person is speaking and the other is listening). Thus, it effects a 2-to-1

compression.

According to StrataCom, its ADPCM teamed with DSI yields a 4-to-1 compression ratio. Timeplex says its Link/100, which also uses DSI, time-domain harmonic scaling, and its proprietary Link Packet Voice Server technology, can attain a 10-to-1 ratio.

Network Strategies' LaRow isn't totally sold on dynamic packet allocation since channels must ask for service. "With dynamic packet allocation, there will always be delays between the request and the service, and that causes throughput degradation," he says.

**Wrap up**

In all, the current lineup of T-1 multiplexers is the best ever, and it provides the widest choice of features. All handle asynchronous inputs and, with the exception of the Emulex Corp. CS-41, accommodate very high-speed synchronous inputs.

Vendors claiming 2.048M bit/sec may have gotten a little carried away. That's the speed for international T-1, and since one 64K bit/sec channel is reserved for signaling, that leaves only 1.984M bit/sec for user data.

Multiplexer voice-handling facilities range from proprietary techniques that stuff multiple calls into each DS0 to the time-honored Pulse Code Modulation (PCM) — which provides toll quality to anyone's ear but at the cost of one DS0 channel per caller. Remember, any time you deviate from an AT&T standard — in this case, PCM and ADPCM — you can't use public switching facilities.

For those shopping for network/backbone systems, there are many products from which to choose. All claim dynamic routing and very user-friendly network management systems, but what constitutes those facilities is a matter of interpretation. □

Pro

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There's little physical security to a bus network when anyone can tap the coaxial cable to add an extra workstation. With a twisted-pair Ethernet's star topology, users cannot add themselves to the network without accessing a port on the concentrator, which is in the wiring center.

This room can be locked to ensure that only authorized workstations are on the network. Having a central point for management also

makes record keeping easier.

The trends in local net cabling are clearly in favor of using non-shielded twisted pair. A recent Gartner Group, Inc. forecast predicts the rapid growth of star-topology, nonshielded twisted-pair local-area networks and an increase in fiber-optic backbone cable in local nets.

The EIA TR41.8 building standards committee has specified non-shielded twisted pair for lateral cable runs and fiber optics for the backbone in star-topology networks. In addition, both AT&T's

Premises Distribution System and Northern Telecom, Inc.'s Integrated Building Distribution Network specify this combination.

Major corporations are installing nonshielded twisted-pair Ethernets because they have proven to be reliable, manageable and cost-effective. Many users have even abandoned their coaxial cable and have put all their Ethernet on the twisted pair that was on the premises, simply because the cost to manage and maintain a coaxial network was excessive.

In contrast to using twisted pair,

problems with coaxial cable are too hard to find and often require the network to be taken down for repairs.

Traditional Ethernet uses a bus architecture and coaxial cable that offers no flexibility, no simple method for network fault isolation and no cost-effective method for installation or ongoing maintenance.

However, the availability of Ethernet-over-telephone wire is a major technological achievement that provides an efficient, cost-effective networking solution. □

Con

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bit/sec Ethernet over twisted pairs in the same bundle, and who don't wish to experience performance degradation, will undoubtedly use 10M bit/sec Ethernet rather than existing nonshielded telephone wire.

Yet another favorite argument for telephone wire Ethernet is that there's no room for any additional cable in buildings already jammed

with wire. But coaxial cables and fiber-optic cables appear on the drawings that accompany these proposals. Why? To interconnect these proprietary, stand-alone twisted-pair systems. That is, a customer would have to find room for the interconnection cables anyway.

Finally, manufacturers of new Ethernet haven't tried to convince potential users that their components are less expensive than those for traditional Ethernet on a cost-

per-connection basis, and rightly so. At a minimum cost of \$550 to \$600 per connection, it's at least \$150 to \$200 more expensive. Cost savings are supposed to appear when the pulling of both Ethernet coaxial cable and the drop cables are accounted for, since existing nonshielded twisted-pair wire is already in place.

There's no general approach for estimating cost. Factors such as the type of building, environment and specific regulations make it

possible only on a case-by-case basis. Regardless, the variety of tests necessary before using existing wire absorbs any potential savings that might be gained by using it.

Even without taking into account the other deficiencies of existing telephone wire discussed above, a comparison of coaxial Ethernet and nonshielded twisted-pair Ethernet doesn't deserve any further elaboration when considering the differences in service costs for the two systems. □



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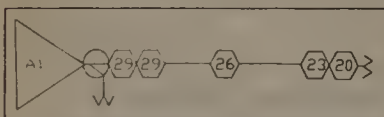
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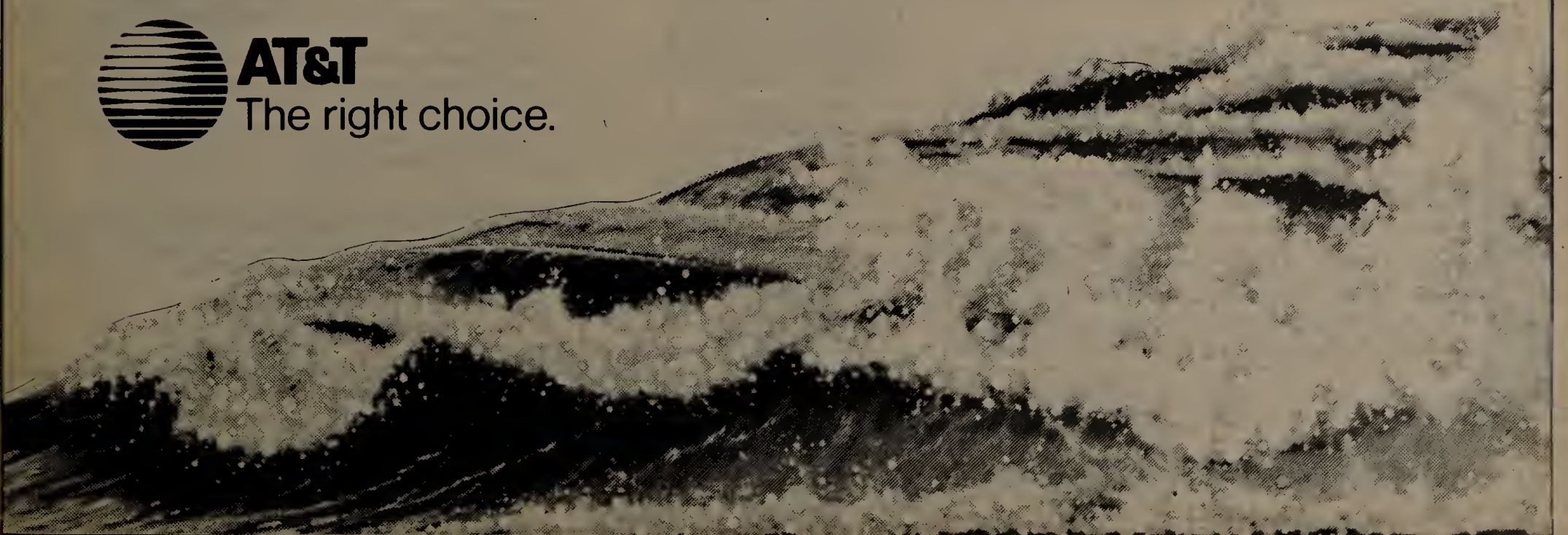
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# NETWORK WORLD

A number of Management Updates, Data Comm Buyer's Guides, Telecom Buyer's Guides, PC Buyer's Guides and Industry Focuses are scheduled to run in **NETWORK WORLD** during 1988. Each of these features will focus on one aspect of the networking and communications industry and give our advertisers a chance to reach a more select audience. These are some of the topics the features will cover:

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## MAP/TOP drafts net cookbook

continued from page 1

MAP installations today are broadband, adequate information on how to implement these networks has not been available, he said.

The specification represents the recommendations of the MAP/TOP Users Group and is completely compatible with the MAP/TOP 3.0 specification, Bahrololoomi said. The document is designed to educate users about potential problems in implementing broadband networks. As a result, it takes a systems approach to implementing a broadband network, rather than focusing on component specifications.

Representatives from nearly 80 organizations worked to develop the specification, including MAP/TOP users, vendors, the National Bureau of Standards and the Insti-

tute of Electrical and Electronics Engineers, according to Bahrololoomi.

The need for a set of implementation guidelines arose as broadband networks, based on cable television-type cabling and signaling, proliferated. Specifications that had guided cable television installers for outdoor installations had little relevance for inside cabling, according to Dan Zatyko, president of Zatyko Associates, a consulting firm in Tustin, Calif.

Early MAP users also recognized the need for guidelines on how to put broadband networks together and support them, which led to the formation of the MAP/TOP Media Committee in early 1985, Bahrololoomi said.

One area the specification at-

tempts to standardize is channel allocation.

"There are certain channels that are better than others for data communications, and everybody tries to use them," Bahrololoomi said. To bring some order to this, the MAP/TOP document specifies which channels should be allocated to TOP, MAP, video and point-to-point communications, he said.

"With this specification, people building a MAP modem will know exactly what channel to use," Bahrololoomi said.

### Conflict resolution

By clarifying channel allocation, the MAP/TOP Media Committee also hopes to alleviate conflicts that arise when 802.3 Ethernet-like segments of the network attempt to use the same channels as 802.4 token-passing segments of the network.

## NASD to alter net

continued from page 2

will in turn forward the order to the workstation of an appropriate trading partner. There will be no limit on the size of trades conducted via the network.

"This software means any market maker or order-entry firm that has a terminal can communicate with any other one without utilizing the telephone," said Randall Sampietro, vice-president for systems engineering at NASD.

Besides facilitating exchange of OTC stocks under normal conditions, NASD officials expect the new software to eliminate trading bottlenecks, record an audit trail of bids and reduce procedural errors.

The software, developed by NASD itself, provides the originating party with either a positive or negative acknowledgment, depending on the decision of the solicited party. For example, if the offer is refused, a message will appear on the originator's screen saying that the trade has been declined.

The new software has been pilot tested by two large stock traders, Prudential-Bache Securities, Inc. and Shearson Lehman Brothers, Inc.

Under the current system, lengthy trading procedures leave room for errors.

"Each party has to write a ticket and a trade report, send it to someone who keypunches it in and send it over to the clearing corporation [the National Securities Clearing Corp.] to be matched. If there is a mistake, there have to be further entries," Sampietro explained.

"With the new system, those problems disappear. We'll take both sides, automatically send them to the clearing corporation, and we'll handle the trade report for you," he said.

Sampietro said software supporting the larger trades on the network was on the drawing board before the stock market crash, but actual development began after it. "This was something we had con-

ceptualized a while back, and we resurrected and expedited as a result of the Oct. 19 crash," he said.

If the Securities and Exchange Commission approves use of the new software, as is expected, it will be installed on several Tandem Computers, Inc. VLX processors in NASD's data center here. The VLXs are linked to an adjacent Unisys Corp. 1100/90 mainframe used for the quote system, which provides for the collection and dissemination of the fast-changing stock prices.

The network's 3,500 workstations are distributed among hundreds of trading firms around the U.S. and linked by 2,400 bit/sec leased lines to remote concentrators in major cities. Higher speed leased lines link the concentrator sites to the data center. Some of the terminals are custom-built by Harris Corp. Others are IBM Personal Computer-compatibles programmed to emulate the Harris terminals.

Support for increased automated stock trading on the network will take NASD a step closer to a worldwide trading network, which some observers have said is a long-term goal for the company. "This is the first step toward a system that allows you to use the terminals to carry on the negotiation for all trades," Sampietro said.

### Disaster recovery

NASD's network has faced problems other than a topsy-turvy market in recent weeks.

An electrical failure knocked out computers at the data center here, bringing small-block trading to a virtual standstill for 1½ hours, until a remote backup site kicked in and trading resumed ("Backup saves stock mart," NW, Dec. 12, 1987).

The network's recovery focused attention on NASD's backup data center in Rockville, Md., and on the communications equipment used to update the data there. The company uses a Network Systems Corp. Hyperchannel and a T-1 circuit to provide data transfer between the two data sites at speeds up to 50M bit/sec. □

## US Sprint to broaden line

continued from page 1

services will be made possible by completion of US Sprint's nationwide fiber-optic network, sources said. A US Sprint spokesman said the network is "virtually complete."

While US Sprint officials declined to discuss specifics of the announcement, information obtained from the company indicates that the new offerings will be targeted at the high end of the business market.

Industry analysts said they have long been expecting a new series of all-digital services from US Sprint, which currently offers only digital T-1, or 1.544M bit/sec, service in a limited number of locations in the U.S.

"Digital private line service is the perfect utilization of US Sprint's fiber-optic network," said Jeffrey Kaplan, director of communications research at International Data Corp., a market research firm in Framingham, Mass. "Private lines are one of the many types of services US Sprint must offer to catch up with AT&T and MCI and to remain competitive in the large corporate market."

### Services for high-volume needs

According to the information from US Sprint, the services are intended to "appeal to customers with high-volume communications requirements between any two locations or those that require fully dedicated or secure communications."

US Sprint's fiber-optic backbone network will provide customers with "nationwide availability of digital cross-connects," according to the US Sprint information. Digital cross-connects let channels within compound digital signals be routed independently in the net.

Joaquin Gonzalez, director of enterprise network strategies at Gartner Group, Inc. in Stamford, Conn., said, "Last October, US Sprint indicated that it planned to debut a DS0 [64K bit/sec] digital private-line service at rates comparable to analog private lines.

Since many vendors were involved in developing the specification, "no one is going to be surprised by this," said Tony Helies, president of Concord Communications, Inc., based in Marlborough, Mass.

"The good news is the MAP/TOP Committee has been very explicit. All the decisions are consistent with IEEE 802. Users can now sit down and put a cable plant in and be more confident that they have a good clean system," he said.

Helies added that the specification will simplify both vendors' and users' jobs by cutting down on the choices in designing and installing broadband systems.

The MAP/TOP broadband specification will be available from the General Motors Photographic/Graphic Services Administration at 31752 Enterprise Drive, Livonia, Mich. 48150. □

"If that's what they announce this week, it's going to blow the socks off the competition, because AT&T's [Dataphone Digital Service] rates are about three times the price of analog private lines," Gonzalez said.

"When US Sprint enacts a pricing plan that makes digital private lines more attractive than analog private lines, it's going to send shockwaves throughout the industry that AT&T and MCI won't be able to ignore," he said. "This is certainly something I would expect US Sprint to do once they complete their nationwide fiber network."

Gerald Mayfield, director of research at DMW Group, Inc., a consulting firm in Stamford, said, "The all-digital connection will be very attractive to the large corporate user that already has a T-1 network in place and wants to add capability or redundancy. If US Sprint can price the services below AT&T and guarantee reliability, it can really clean up in this market."

### Hurdles remain

Several hurdles remain for US Sprint on the road to user acceptance of its fiber-optic digital services, according to analysts. "US Sprint has to reassure users that it has a way of quickly restoring service if a fiber-optic circuit goes out," Mayfield said.

"Fiber is wonderful because of its reliability and high-quality transmission, but if a guy in a backhoe accidentally digs up the line and cuts it, it's quite a job to repair. US Sprint needs to demonstrate to customers, especially the guys sending their valuable data across the network, that the network has redundancy and can be restored quickly," he said.

Another issue is the availability of digital local access, Gonzalez said. "How quickly the local exchange carriers are going to make local digital special access available is a big question.

"Sprint must get together with the BOCs to ensure that their long-distance digital fiber links will have the same type of local connections at rates that will make these services competitive," he added. □



## AT&T takes a shine to Sun

continued from page 1

that will allow it to keep its lead in the scientific and engineering markets," said Charles Nichols, research analyst at New York-based Shearson Lehman Brothers, Inc.

Under the terms of the agreement, AT&T will acquire 15% of Sun Microsystems by buying newly issued common shares over the next three years at a 25% premium above market value, according to Sun Microsystems spokeswoman Carol Broadbent. AT&T will also be permitted to buy an additional 5% of Sun Microsystems shares on the open market at prevailing market rates, she said. At current prices of Sun Microsystems shares, AT&T's investment would cost roughly \$300 million.

As a result of this strategic partnership, AT&T and Sun Microsystems hope they can boost acceptance of Unix in both technical and Fortune 500 office markets, said Clare Fleig, director of research at the International Technology Group in Los Altos, Calif.

This will be especially important as the two firms increasingly face off against IBM in the Unix market, Fleig said. "IBM is expected to make a major Unix announcement in about five weeks. IBM will roll out Unix software for the mid-range and host environments.

"This joint agreement puts Sun Microsystems and AT&T in a better position to meet IBM head on in the Unix market," Fleig said.

AT&T Data Systems Group President Vittorio Cassoni said AT&T's investment "cements our previous business agreement with Sun Microsystems and guarantees our customers that the financial resources are in place to sustain our strategic commitment to develop a

new Unix system." Cassoni is expected to be nominated to the Sun Microsystems board of directors.

"The financial arrangement flows directly from the earlier technology agreement," said Robert Holder, director of business development for AT&T Data Systems Group.

Scott McNealy, Sun Microsystems president and chief executive officer, said, "The agreement will allow us to remain independent and aggressive in the market with the added financial security that will allow us to execute our market development plans."

In October, Sun Microsystems and AT&T announced that they planned to develop a new version of AT&T's Unix System V operating system, incorporating Sun Microsystems' recently announced Scaleable Processor Architecture (SPARC) technology, said William Woo, Sun Microsystems senior

product manager. SPARC is a reduced instruction-set computing technology that requires 50% fewer instructions to run the operating system.

As part of the technology agreement, the two firms will integrate several features of the SunOS version of Unix into AT&T's Unix System V. This will create a Unix operating system that could become a de facto industry standard.

The joint development will include the integration of SunOS Network File System into the System V. In addition, Sun Microsystems has been successful at developing communications gateways between Unix and other communications architectures, such as Open Systems Interconnect and IBM's Systems Network Architecture.

"When you deal with a single operating system, communications across systems and between networks becomes seamless," Nichols said. "The creation of a ubiquitous version of Unix is going to accelerate this whole process," he said. □

## SNADS to take lead in SNA nets

continued from page 5

Calif., and Orion Network Systems, Inc. in Berkeley, Calif., recently introduced SNADS products. Customers can take these packages and layer application software, such as file transfer programs, on top of them to build their own document delivery systems.

Large corporations have begun examining such uses of SNADS. J.C. Penney Co., Inc. in Atlanta is searching for a way to distribute data among 40 IBM mainframes and thousands of remote processors.

Paul Gillen, manager of soft-

ware evaluation and development at J.C. Penney, said the company evaluated products from IBM, CSI and Orion as well as the Network Data Mover from The Systems Center, Inc. in Richardson, Texas.

Gillen found each product lacking in needed features. One problem was that use of the products would be labor-intensive. "Vendors assume there is an operator managing a remote node, but that is not always true," he said. "At some locations, we have IBM mainframes running unattended."

Also, software vendors did not strictly conform to IBM's specifications. Consequently, J.C. Penney is thinking about writing its own delivery software. □

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**Jan. 18-21, Tampa, Fla. — 16th Annual BICSI Conference. Telecommunications Distribution Design in Buildings.** Contact: BICSI, University of South Florida, LLL 012, Tampa, Fla. 33620.

**Jan. 19-20, Chicago — Networking the IBM Personal Computer, XT and Compatibles.** Contact: Data Tech Institute, Lakeview Plaza, P.O. Box 2429, Clifton, N.J. 07015.

**Jan. 19-20, Chicago — Understanding ISDN.** Contact: Telecommunications Research Associates, P.O. Box 1200, Newark, Ill. 60541.

**Jan. 20, New York — Corporate PC Data Communications and Connectivity.** Contact: Access Data Products, Inc., 559 Gramatan Ave., Mount Vernon, N.Y. 10552.

**Jan. 20, Washington, D.C. — Expedited Funds Availability Symposium.** Contact: American Bankers Association, 1120 Connecticut Ave. N.W., Washington, D.C. 20036.

**Jan. 25, Washington, D.C. — Communication Networks Conference and Exposition In-Depth Seminar Curriculum.** Contact: Communication Networks '88 In-Depth Tutorial Program, P.O. Box 9171, Framingham, Mass. 01701.

**Jan. 25-26, Tampa, Fla. — Introduction to Telecommunications Systems: Technologies and Applications.** Contact: Business Communications Review, 950 York Road, Hinsdale, Ill. 60521.

**Jan. 25-29, Washington, D.C. — Application of T-Carrier to Private Networking.** Contact: George Washington University, School of Engineering and Applied Science, Washington, D.C. 20052.

**Jan. 26-27, Somerset, N.J. — Data Comm I and II.** Contact: Center for Advanced Professional Education, Suite 110, 1820 E. Garry St., Santa Ana, Calif. 92705.

**Jan. 28-30, Fort Lauderdale, Fla. — Winter Convention of the National Association of Telecommunications Dealers.** Contact: Frontier Computer, 4025 Bronze Way, Dallas, Texas 75237.

**Feb. 3-5, Milwaukee — Working with Personal Computer Local-Area Networks.** Contact: Center for Continuing Engineering Education, University of Wisconsin-Milwaukee, 929 N. Sixth St., Milwaukee, Wis. 53203.

**Feb. 8-10, Boston — X.25 in Practice.** Contact: Technology Transfer Institute, 741 10th St., Santa Monica, Calif. 90402.



► **PRODUCT COMPARISON**

# Breaking net control barriers

*AT&T and TPI products take charge of users' Dataphone Digital Service nets.*

**BY JOHN J. HUNTER**  
Contributing Editor

Until the advent of secondary channel data service units (DSU), users of AT&T's Dataphone Digital Service (DDS) and its imitators had to live with degraded transmission when diagnostic or system-monitoring data was being transmitted.

With the secondary channel, however, users can initiate tests over the channel and, depending on the operation being performed, can return results over it as well. Commands can also be issued over the secondary channel to isolate defective components, such as a failed streaming device.

For users requiring high-level control and secondary channel capability, AT&T, based in Basking Ridge, N.J., and Teleprocessing Products, Inc. (TPI), based in Simi Valley, Calif., offer central network controllers that provide real-time status monitoring, testing and trouble isolation within point-to-point, multipoint and multidrop configurations.

AT&T's Dataphone II SC 300 and SC 400 both work in conjunction with its Series 2500, 2600 and 2700 DSUs over conventional DDS and DDS II with secondary channel (DDS II/SC). In addition, the controllers can be used with analog circuits or with a combination of analog and digital circuits.

TPI's Multidrop Network Manager (MNM), like the AT&T system, operates on conventional DDS and DDS II/SC. The unit, however, doesn't support analog modems. The MNM controller works with TPI's Model TP 502, 552, 2502 and 2552 DSUs.

## The DSUs

Both the AT&T and TPI DSUs support local and remote loop-back testing, plus self-test facilities in which a special test pattern is generated by the DSU and checked for errors. The loop-back and self tests can be initiated from the front panel of the DSU, or the controllers can invoke them. The SC 300 and SC 400 controllers can also access services from AT&T Data Maintenance and Operations Control Centers, located in regional test centers, where sophisticated diagnostics can be performed.

The AT&T 2500, 2600 and 2700 DSUs operate at switch-selectable full-duplex speeds of 2,400, 4.8K, 9.6K and 56K bit/sec. All three are available in stand-alone or rack-mountable versions.

The Model 2500 provides direct-connection DDS, while the Model 2600 can be used for tributary locations as well as for direct connection. The Model 2700 is intended

ed for use with DDS II/SC and can be used for direct-connect or tributary applications.

The TPI TP 502 and TP 552 are also offered in stand-alone and rack-mountable versions. The TP 502 has switch-selectable, full-duplex speeds of 2,400, 4.8K and 9.6K bit/sec, while the TP 552 operates at 56K bit/sec full-duplex.

Both can be used for direct DDS connection or in tributary applications. The AT&T DSUs are more flexible, supporting all speeds up to 56K bit/sec. For users concerned with product investment, the ability to use AT&T's DSU over a wide range of applications is a plus.

The TP 2502 and TP 2552 are TP 502s and TP 552s with a secondary channel facility. Two versions of each are offered, one with a virtual secondary channel and the other with a pseudo-secondary channel. The pseudo-secondary channel is significant because it doesn't rob bits to transmit diagnostic information, according to the vendor.

Secondary channel facilities allow DSUs attached to the central controller to report their status continually to the controller without using primary channel bandwidth. The central-site operator can use the secondary channel to initiate DSU tests and, depending on the type of test, receive the results over the same channel. For example, if the operator wants to check the DSU's status, that command and its results can be handled over the secondary channel.

## AT&T DSUs are more flexible, supporting up to 56K bit/sec.

The TP 2502 and 2552 versions with pseudo-secondary channel capability use statistical multiplexing to mix diagnostic data with transmitted information. TPI says statistical multiplexing doesn't rob primary bandwidth, since only unused portions of it are used to carry the test data.

However, during heavy data terminal equipment transmission periods, system tests and monitoring information might be delayed due to a bandwidth shortage.

Another version of the TP 2502, called the 2502A, allows a virtual secondary channel to carry asynchronous data (DSUs and modems with secondary channels normally handle synchronous inputs).

Asynchronous transmission is accommodated through a built-in asynchronous-to-synchronous data converter and allows data transmission up to 300 bit/sec on the

2502 and up to 2,400 bit/sec on the 2552. The asynchronous facility is a distinct advantage for TPI, since it eliminates the expense of analog lines and modems to handle data. AT&T has no comparable product.

## Testing and monitoring

Both controllers furnish a central-site capability for monitoring and testing the entire network transmission facility as well as each connected DSU. The AT&T SC 300 and SC 400 have the same test and measurement capabilities. They differ in the number of network-control and tributary DSUs accommodated and the number of system operator consoles that can be configured.

The SC 300 handles up to 2,048 network-control DSUs and four local or remote operator consoles. The number of tributary DSUs accommodated was not given by AT&T. The SC 400 also handles up to 2,048 network-control DSUs, up to 30,000 tributary DSUs and up to 11 operator consoles.

Both controllers report system events and test results on a real-time basis but have no storage facilities to accumulate historical data. That's a distinct disadvantage since users have no way of tracking overall network performance. However, AT&T does provide an interface to its 3B2 computer, which can be used to record and print out historical information.

The MNM comes in two versions, the TP 3502 and TP 3503. The TP 3502 controls 16 DDS lines, and each handles up to 62 DSUs. For larger networks, the TP 3503 cascades up to 16 fully configured TP 3502s to form a single network.

The MNM requires an IBM Personal Computer XT, Personal Computer AT or compatible as its operator console. It also stores test results and generates system reports. The accumulated information can be formatted into IBM NetView-compatible records and forwarded to an IBM central processor via NetView/PC. TPI charges \$500 for the NetView/PC and record-formatting software.

Although the MNM TP 3502 supports only one operator console, it offers more extensive system tests through optional software. The standard TP 3502 tests are essentially the same as the AT&T products' tests. However, when fitted with optional diagnostic software, which costs \$500, the TPI product monitors and records response time, line utilization and system events.

## User view

Doug Becker, manager of data processing and telecommunications with Idaho Power and Light in Boise, Idaho, installed an SC 300 with Model 2600 and 2700 DSUs about

eight months ago. He says he's satisfied because it allowed him to get rid of a network comprising DSUs with wrap boxes and separate communications lines for handling diagnostics.

In addition, the old configuration needed a separate network controller for analog data components. "That [DDS configuration] was costing \$1,700 a month just for the lines, and it needed its own controller," Becker says. "With the Dataphone product, both [the analog and digital] networks are controlled by the same unit."

Becker says that since DDS II/SC isn't available in his operat-

## Asynchronous facility is an advantage for TPI.

ing area, he had to negotiate a contract with Mountain Bell for additional bandwidth to accommodate the secondary channel information. "Our 64K bit/sec lines need an additional 8K bit/sec, and the 9.6K bit/sec lines need around 3K bit/sec for [the secondary channels]," he says.

Even with the additional costs, Becker says he's getting a bargain. "We only have five 64K and 11 9.6K lines," he says. "We're paying an additional \$30 per month [per line] for the side channel on the 9.6K lines and \$60 per month for the 64K. We save on line costs alone, not to mention the hardware [the controller and wrap boxes] of the digital network."

MNM users contacted by *Network World* did not respond by press time.

## Summary

AT&T's Dataphone II and TPI's MNM all sport the same basic monitoring and testing capabilities of the better analog network management systems. Also, all support secondary diagnostic channels, allowing them to be used on DDS II/SC or secondary channel paths established over conventional DDS facilities.

AT&T's offering, however, can be used for analog and digital networks, obviating the need for separate controllers — a big operational and cost advantage.

The Dataphone II costs \$45,000, excluding DSUs, which are priced as follows: Model 2500, not available; Model 2600, \$2,050 to \$2,200; and Model 2700, \$1,899 to \$2,100. The MNM costs \$9,400, and the following DSUs are available: TP 502 at \$650; TP 552 at \$650; TP2502 at \$1,850; and TP 2552 at \$1,975. □

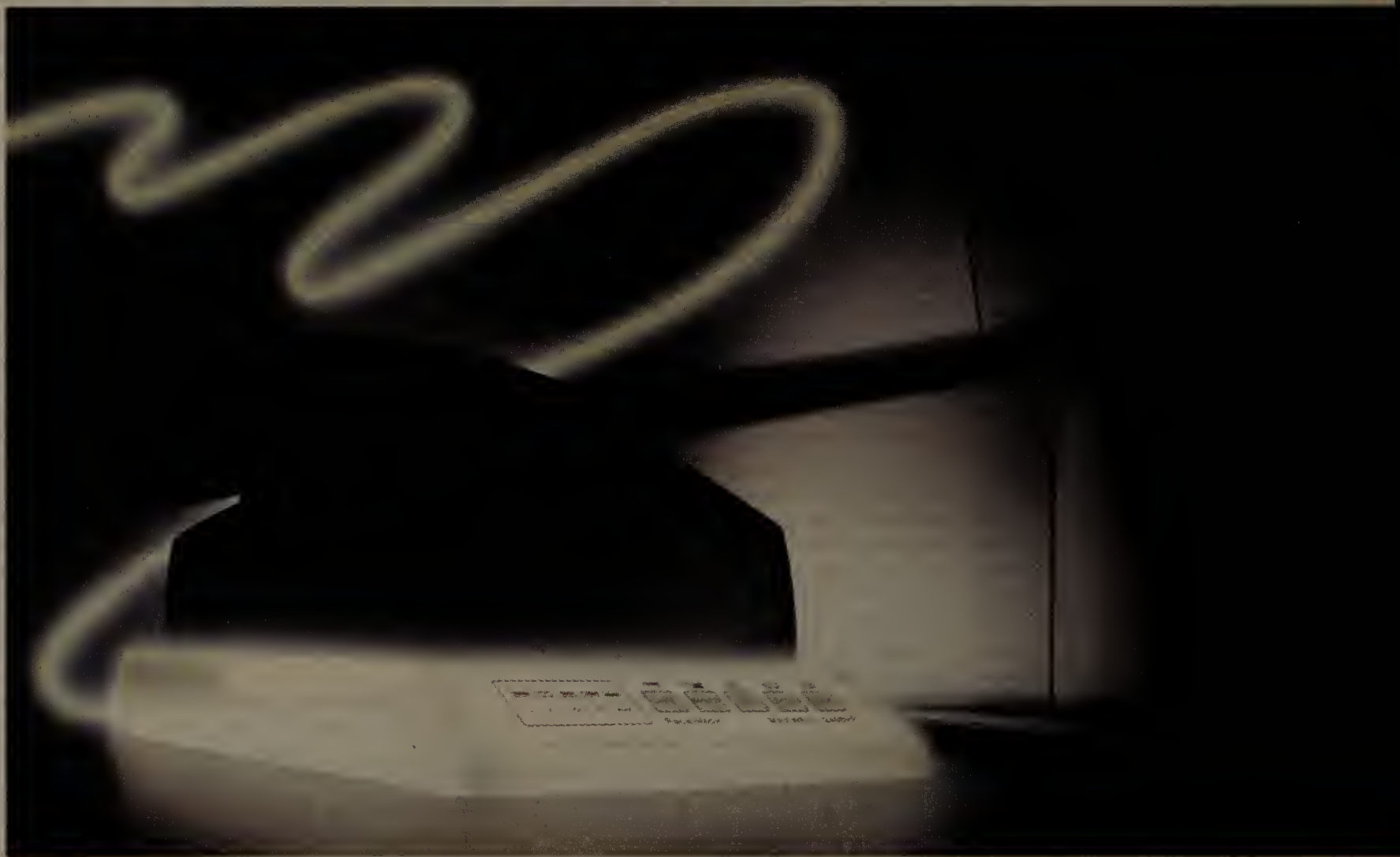
*Hunter is president of TMS Corp., a telecommunications consulting firm in Devon, Pa.*



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